



Advance Product Data*

Aquazone™ 50PSH, PSV007-070 Single-Stage Water Source Heat Pumps with Puron® Refrigerant (R-410A)

**For units purchased on or after May 12, 2014.*

1/2 to 6 Nominal Tons



Single-package horizontally and vertically mounted water source heat pumps with electronic controls offer:

- Electronically commutated motor (ECM) variable speed blower motor option
- Stainless steel drain pan
- Mute package for quieter operation available
- Versatility: apply to commercial boiler/cooling tower or geothermal applications (select extended range option for use in geothermal applications)
- Performance certified to ARI/ISO 13256-1:1998
- Flexible and reliable multiple protocol WSHP Open controller can use BACnet[†], Modbus[†], N2, and LON (with a separate card) protocols for integrating energy efficiency and precise unit control (field-installed accessory)
- Hot gas reheat (HGR) available for dehumidification capability
- Optional tin-plated copper tubing and polymer coated aluminum fin evaporator coil available
- Non-ozone depleting Puron refrigerant (R-410A)

Features/Benefits

The Aquazone single-stage water source heat pump with Puron refrigerant (R-410A) is a high quality, efficient solution for all boiler/tower and geothermal applications.

Operating efficiency

Carrier water source heat pumps (WSHPs) are designed for quality and high performance over a lifetime of operation. Single-stage WSHP models with Puron refrigerant (R-410A) offer cooling EERs (Energy Efficiency



Features/Benefits (cont)



Ratios) to 28.8 and heating COPs (Coefficient of Performance) to 5.9.

All efficiencies stated are in accordance with standard conditions under ISO (International Organization for Standardization) Standard 13256-1:1998 and provide among the highest ratings in the industry, exceeding ASHRAE (American Society of Heating, Refrigerant and Air-Conditioning Engineers) 90.1 Energy Standards.

High quality construction and testing

All units are manufactured to meet extensive quality control protocol from start to finish through an automated control system, which provides continuous monitoring of each unit and performs quality control checks as equipment progresses through the production process. Standard construction features of the Aquazone™ units include:

Cabinet — Standard unit fabrication consists of heavy gage galvanized sheet metal cabinet construction designed for part standardization (i.e., minimal number of parts) and modular design.

All interior surfaces are lined with 1/2 in. thick, 1 1/2 lb per cubic ft density, foil faced Micromat insulation for thermal insulation and acoustical attenuation. This insulation is non-combustible, non-hygroscopic and does not support fungal growth. Insulation meets NFPA90A and 90B for fire protection and is certified to meet the Greenguard Indoor Air Quality Standard for Low Emitting Products.

Protection against corrosion is a feature in the PS series. A stainless steel

drain pan is designed to last the lifetime of the unit and resist corrosion and cracking that may occur with steel or plastic materials.

Compressor — Aquazone 50PS single-stage units include a rotary compressor in sizes 007-018 and a scroll compressor in sizes 024-070. Single-stage models with Puron® refrigerant (R-410A) offer a dual level vibration isolation system. The compressor has thermal overload protection and is located in an insulated compartment away from the airstream to minimize sound transmission.

ARI/ISO labels — Aquazone units have ARI (Air-Conditioning & Refrigeration Institute)/ISO, NRTL (Nationally Recognized Testing Lab), or ETL labels and are factory tested under normal operating conditions at nominal water flow rates.

Blower and motor assembly — Large blower wheels allow the unit to operate at lower speeds for quieter operation.

PSC blower motors are standard on unit sizes 1/2 through 1 ton. Constant torque motors are standard on unit sizes 1 1/4 through 6 tons.

Multiple speed ECM motor option on unit sizes 1 1/4 through 6 tons allows the user to select the correct speed to deliver the specified airflow and the design system static pressure.

Motors are mounted on the fan housing with rubber grommets to prevent noise and vibration transmission to the unit and airstream.

A 1-in. supply air duct-flange connection is standard, facilitating duct instal-

lation on the unit. Horizontal units are field convertible from straight through to an end discharge arrangement.

Refrigeration/water circuit — All units contain sealed Puron refrigerant (R-410A) circuits including a high-efficiency hermetic compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum-lanced fin and rifled copper tube refrigerant-to-air heat exchanger, reversing valve, coaxial (tube-in-tube) refrigerant-to-water heat exchanger, and safety controls including a high-pressure switch, low-pressure switch, water coil low temperature sensor, and air coil low temperature sensor.

Quiet operation

All panels are insulated with 1/2 in. thick, 1 1/2 lb per cubic ft density foil faced fiberglass insulation for better thermal insulation and noise reduction. All units have a unique floating base pan where the compressor and condenser are mounted on a heavy steel plate that rests on a high density rubber pad in the base of the unit. In addition, compressors are mounted on rubber grommets. This double isolation is standard on all units preventing vibration and noise transmission from the compressor to the unit structure.

Fan motor insulation and double isolated compressor are provided for sound isolation, cabinets are fully insulated to reduce noise transmission, low speed blowers are utilized for quiet operation through reduced outlet air velocities, and air-to-refrigerant coils are designed for lower airflow coil face velocities. Additional sound mitigation can be attained with the mute package option.

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Puron® refrigerant (R410-A)

Puron refrigerant (R-410A) is a non-chlorine based environmentally balanced, non-ozone depleting refrigerant. Puron refrigerant characteristics, compared to R-22, have:

- Binary and near azeotropic mixture of 50% R-32 and 50% R-125.
- Higher efficiencies (50 to 60% higher operating pressures).
- Virtually no glide. Unlike other alternative refrigerants, the two components in Puron refrigerant have virtually the same leak rates. Therefore, refrigerant can be added if necessary without recovering the charge.

Optional evaporator coil protection

All units come standard with a copper coil aluminum fin evaporator coil. These evaporator coils employ lanced fin and rifled tubing for maximum heat transfer. Large face areas result in lower face velocity reducing sound while ensuring high latent heat removal for maximum dehumidification in the cooling mode.

Optional tin electro-plated copper tubing with high-tech polymer coated aluminum fins protect the evaporator coil from all forms of corrosive elements in the airstream. Corrosion often results in refrigerant leaks and eventual failure of the air coil costing hundreds of dollars to replace. Studies have also shown that these air coil coatings improve moisture shedding and therefore improve a unit's moisture removal capability resulting in a more comfortable indoor environment. The 50PSH and PSV units assure both maximum air coil life and comfort.

Design flexibility

Airflow configurations for horizontal units are available in four patterns including left or right return, and left, right, or back discharge. Horizontal and downflow units are field convertible from left or right discharge to back discharge. Vertical units are available in three airflow patterns including top discharge with right or left return. Standard entering water temperature is between 50 and 100 F. Extended entering water temperature range between 25 and 110 F offers maximum design flexibility for all applications. Water flow rates as low as 1.5 gpm per ton assist with selection from a various

range of circulating pumps. Factory-installed options are offered to meet specific design requirements.

Safe, reliable operation

Standard safety features for the refrigerant circuit include high-pressure switch, low-pressure sensor to detect loss of refrigerant, and low air temperature sensor to safeguard against freezing. Equipment safety features include water loop temperature monitoring, voltage protection, water coil freeze protection, and standard electronic condensate overflow shutdown. All safety features are tested and run at the factory to assure proper operation of all components and safety switches.

All components are carefully designed and selected for endurance durability, and carefree day-to-day operation.

The Aquazone™ unit is shipped to provide internal and external equipment protection. Shipping supports are placed under the blower housing and compressor feet. In addition, both horizontal and vertical units are mounted on oversized pallets with lag bolts for sturdiness and maximum protection during transit.

Ease of installation

The Aquazone unit is packaged for simple low cost handling, with minimal time required for installation. All units are pre-wired and factory charged with refrigerant. Horizontal units are provided with factory-installed hanger isolation brackets. Vertical units are provided with an internally trapped condensate drain to reduce labor associated with installing an external trap for each unit. Water connections $\frac{3}{4}$ in. diameter (FPT) and condensate drains are anchored securely to the unit cabinet, eliminating the need for backup wrenches.

Simple maintenance and serviceability

The Aquazone water source heat pump (WSHP) units are constructed to provide ease of maintenance. Units allow access to the compressor section from 2 sides and have large removable panels for easy access. Additional panels are provided to access the blower and control box sections.

The blower housing assembly can be serviced without disconnecting ductwork from the dedicated blower access

panel. Blower units are provided with permanently lubricated bearings for worry-free performance. Blower inlet rings allow removal of the blower wheel without having to remove the housing or ductwork connections.

Electrical disconnection of the blower motor and control box is easily accomplished from quick disconnects on each component.

Easy removal of the control box from the unit provides access to all refrigeration components.

The refrigeration circuit is easily tested and serviced through the use of high and low pressure ports integral to the refrigeration circuit.

Maximum control flexibility

Aquazone water source heat pumps provide reliable control operation using a standard microprocessor board with flexible alternatives for many direct digital controls (DDC) applications including the Carrier Comfort Network® (CCN) controls and open protocol systems.

The Aquazone standard unit solid-state control system, the Complete C, provides control of the unit compressor, reversing valve, fan, safety features, and troubleshooting fault indication features. The Complete C control system is a user friendly, low cost, advanced WSHP control board. Many features are field selectable to maximize flexibility in field installation. The overall features of this standard control system include:

50-va transformer — The transformer assists in accommodating accessory loads.

Anti-short cycle timer — The timer provides a minimum off time to prevent the unit from short cycling. The 5-minute timer energizes when the compressor is deenergized, resulting in a 5-minute delay before the unit can be restarted.

Random start relay — The random start relay provides a random delay in energizing each different WSHP unit. This option minimizes peak electrical demand during start-up from different operating modes or after building power outages.

High and low pressure refrigerant protection — This protection safeguards against unreliable unit opera-

Features/Benefits (cont)



tion and provides a warning for refrigerant leaking.

Condensate overflow sensor —

The condensate overflow sensor is standard on all horizontal units and optional on all vertical units. The electronic sensor is mounted to the drain pan. When condensate pan liquid reaches an unacceptable level, unit is automatically deactivated and placed in a lockout condition. Thirty continuous seconds of overflow is recognized as a fault by the sensor.

High and low voltage protection

— Safety protection for excessive or low voltage conditions is included.

Automatic intelligent reset — The unit will automatically restart 5 minutes after shutdown if the fault has cleared. Should a fault occur 3 times sequentially, lockout will occur.

Filter drier — All units, two ton and above, are provided with filter driers to ensure that no residual water or other foreign material is present to contaminate the refrigerant system and lead to premature failure.

Low pressure bypass timer — The low pressure switch is bypassed for 120 seconds after it opens to prevent nuisance low pressure lockouts during cold start-up in the heating mode.

Accessory output — A 24-v output is provided to cycle a motorized water valve or damper actuator with compressor in applications such as variable speed pumping arrangements.

Performance Monitor (PM) — This feature monitors water temperatures to warn when the heat pump is operating inefficiently or beyond typical operating range. Field selectable switch initiates a warning code on the unit display.

Water coil freeze protection (selectable for water or antifreeze) —

The field selectable switch for water and water/glycol solution systems initiates a fault when temperatures exceed the selected limit for 30 continuous seconds.

Air coil freeze protection (check filter operation) —

The field selectable switch for assessing excessive filter pressure drop initiates a fault when temperatures exceed the selected limit for 30 continuous seconds.

Alarm relay setting — A selectable 24-v or pilot duty dry contact provides activation of a remote alarm.

Electric heat option — The output provided on the controller operates two stages of emergency electric heat.

Service Test mode with diagnostic LED (light-emitting diode) —

The Service Test mode allows service personnel to check the operation of the WSHP and control system efficiently. Upon entering Service Test mode, time delays are sped up, and the Status LED will flash a code to indicate the last fault experienced for easy diagnosis. Based on the fault code flashed by the status LED, system diagnostics are assisted through the use of Carrier — provided troubleshooting tables for easy reference to typical problems.

LED visual output — An LED panel indicates high pressure, low pressure, low voltage, high voltage, air/water freeze protection, condensate overflow, and control status.

Hot gas reheat — Hot gas reheat (HGR) allows the user to control not only space temperature, but also humidity levels within the conditioned space. Excessive moisture in the space can promote mold growth leading to damage in the structure or interior surfaces, as well as reducing the air quality

and creating an unhealthy environment.

Excess humidity may be caused by the unit having to operate under a widely varying load, an oversized short cycling unit, a high percentage of unconditioned outside air being introduced into the space, a high latent load in the space and any location where humidity infiltration is a problem.

Typical unit control is by a wall mounted thermostat that senses temperature in the occupied space. By utilizing a humidistat in addition to the thermostat, we are able to monitor the humidity levels in the space as well. The HGR option allows cooling and dehumidification to satisfy both the thermostat and humidistat while preventing over cooling of the space while in the dehumidification mode.

Once the thermostat reaches set point temperature and the humidity is above set point, the unit controller will energize the reheat valve operating the unit in hot gas reheat mode, first cooling and dehumidify, then reheating the air using hot refrigerant gas before delivering it to the space, usually 2 to 5 F below room temperature. The unit is now operating as a dehumidifier. By reheating the air along a constant sensible heat line, the relative humidity of the leaving air is reduced.

The moisture removal capacity of a specific heat pump is determined by the unit latent capacity rating. A heat pump's latent capacity can be determined by reviewing the heat pump specification data sheets. Depending upon the entering water and air conditions, a total and sensible capacity can be interpolated from the data sheets. Subtracting sensible capacity from total capacity by 1069 (Btu/lb of water vapor at 80° db and 67° wb) yields the amount of moisture removal in pounds per hour.

* Sponsored by ASHRAE (American Society of Heating, Refrigerating, and Air-Conditioning Engineers).

† Registered trademark of Schneider Electric.

Model number nomenclature



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50PSH,PSV PREMIUM EFFICIENCY

Aquazone™ Single Stage Water Source Heat Pump with Puron® Refrigerant (R-410A)

50PSH – Horizontal Configuration

50PSV – Vertical Upflow Configuration

Size – Nominal Tons

007 – 1/2	018 – 1-1/2	042 – 3-1/2
009 – 3/4	024 – 2	048 – 4
012 – 1	030 – 2-1/2	060 – 5
015 – 1-1/4	036 – 3	070 – 6

Airflow Configuration

Horizontal

Option	Return	Discharge	Blower Motor
B –	Right	End	PSC
C –	Right	Left (Straight)	Constant Torque
E –	Left	Back	PSC
H –	Left	Straight	Constant Torque
M –	Right	End	Constant Torque
N –	Right	Left (Straight)	ECM
P –	Right	End	ECM
S –	Left	Straight	PSC
T –	Left	Back	Constant Torque
W –	Left	Right (Straight)	ECM
Y –	Left	Back	ECM
Z –	Right	Left (Straight)	PSC

Vertical

Option	Return	Discharge	Blower Motor
D –	Right	Top	Constant Torque
J –	Left	Top	ECM
K –	Right	Top	ECM
L –	Left	Top	PSC
R –	Right	Top	PSC
Z –	Left	Top	Constant Torque

Control

- C – Standard C Microprocessor Control Package
- D – Standard D Microprocessor Control Package

C Microprocessor is UPM, 50va transformer

D Microprocessor includes 75va transformer and all electric options D, G, H, I, J, Z

Factory Installed Options

	Std Filter	MERV8 Filter	MERV13 Filter
None	X	Y	Z
5 kW Electric Heat	A	B	W
10 kW Electric Heat	C	F	R
15 kW Electric Heat	D	G	S
20 kW Electric Heat	E	T	H

Operating Range/Sound Option

	Standard Range		Extended Range	
	Std	Extra Quiet	Std	Extra Quiet
Standard	C	N	A	J
1/2" Closed Cell Foam	E	P	D	F

Valve Options

- A – 2-Way Solenoid
- B – Measureflow
- C – None
- D – 2-way Solenoid with Measureflow

Revision Code

- A – Current Revision

Voltage

- 0 – 115-1-60
- 3 – 208/230-1-60
- 4 – 265-1-60
- 5 – 208/230-3-60
- 6 – 460-3-60
- B – 115-1-60 with Disconnect
- C – 208/230-1-60 with Disconnect
- D – 265-1-60 with Disconnect
- E – 208/230-3-60 with Disconnect
- F – 460-3-60 with Disconnect

Refrigerant Circuit Options

- | | |
|-----------------------|----------------------------|
| A – Cu, Coated | L – HGB, HGR |
| B – Cu, HWG | M – CuNi, HGR, HGB |
| C – Cu | N – CuNi |
| D – Cu, Coated, HGR | P – CuNi, HGR |
| E – Cu, HGR | R – Cu, Coated, HGR, HGB |
| F – CuNi, Coated HGR | S – CuNi, HGB |
| G – CuNi, HWG | T – Cu, HGB |
| H – Cu, Coated, HWG | U – Cu, Coated, HGB |
| J – CuNi, Coated | V – CuNi, Coated, HGR, HGB |
| K – CuNi, Coated, HWG | W – CuNi, Coated, HGB |

LEGEND

- ECM – Electronically Commutated Motor
- HS – High Static
- HGB – Hot Gas Bypass
- HGR – Hot Gas Reheat
- HWG – Hot Water Generator
- PSC – Permanent Split Capacitor



ARI/ISO capacity ratings



PSC MOTOR

50PS UNIT SIZE	FLUID FLOW RATE gpm	WATER LOOP HEAT PUMP				GROUND WATER HEAT PUMP				GROUND LOOP HEAT PUMP			
		Cooling 86 F		Heating 68 F		Cooling 59 F		Heating 50 F		Cooling 77 F		Heating 32 F	
		Capacity Btuh	EER	Capacity Btuh	COP	Capacity Btuh	EER	Capacity Btuh	COP	Capacity Btuh	EER	Capacity Btuh	COP
07	2.0	6,800	15.7	8,800	5.7	8,400	25.1	7,000	4.9	7,400	18.5	5,100	3.6
09	2.5	9,000	16.2	11,200	5.5	10,500	25.5	9,000	4.5	9,500	19.3	6,800	3.6
12	4.0	12,200	14.9	16,500	5.1	14,600	22.7	13,000	4.3	13,000	17.5	10,000	3.6

ECM AND CONSTANT TORQUE MOTOR

50PS UNIT SIZE	FLUID FLOW RATE gpm	WATER LOOP HEAT PUMP				GROUND WATER HEAT PUMP				GROUND LOOP HEAT PUMP			
		Cooling 86 F		Heating 68 F		Cooling 59 F		Heating 50 F		Cooling 77 F		Heating 32 F	
		Capacity Btuh	EER	Capacity Btuh	COP	Capacity Btuh	EER	Capacity Btuh	COP	Capacity Btuh	EER	Capacity Btuh	COP
15	4.0	15,200	17.5	17,500	5.6	17,000	28.8	13,000	4.6	16,200	20.6	11,000	3.9
18	5.0	19,500	16.4	21,300	5.3	21,300	25.6	17,700	4.5	20,500	19.0	14,800	3.8
24	6.0	24,500	18.2	28,500	5.7	28,400	28.1	23,700	4.6	26,000	21.1	18,000	4.0
30	7.0	27,000	16.6	31,000	5.9	31,700	27.0	25,000	5.2	28,500	19.4	20,500	4.3
36	10.0	36,000	17.2	41,000	5.6	40,200	25.9	34,400	4.9	37,500	19.7	26,000	4.1
42	10.5	40,600	18.2	42,400	6.0	45,000	25.7	35,000	5.1	42,200	21.7	26,800	4.1
48	12.0	47,400	17.2	50,000	5.3	52,900	26.1	40,500	4.3	49,500	20.0	33,400	3.7
60	15.0	60,400	16.2	71,500	5.7	66,500	24.1	56,700	4.9	61,500	18.5	47,000	4.2
70	17.0	68,000	16.2	86,000	5.6	71,400	22.4	71,400	5.0	70,500	18.5	56,500	4.2

LEGEND

COP — Coefficient of Performance
db — Dry Bulb
EER — Energy Efficiency Ratio
wb — Wet Bulb

NOTE: Tabulated performance data is at noted water temperatures and entering air conditions of 80.6F DB/66.2F WB at ARI/ISO 13256-1 rated CFM.



Physical data



50PS UNIT SIZE	007	009	012	015	018	024
Compressor Type	Rotary					Scroll
Maximum Water Working Pressure (psig/kPa)	400/3100	400/3100	400/3100	400/3100	400/3100	400/3100
Standard Fan Motor and Blower						
Fan Motor Type/Speeds	PSC/3			Const Torque/3-Speed		
Fan Motor (hp)	1 / 10	1 / 10	1 / 10	1 / 3	1 / 3	1/2* / 1/3
Blower Wheel Size (Diameter x Width)	4.5 x 4.5	4.5 x 4.5	5.5 x 5.5	5.5 x 4.5	9 x 7	9 x 7
ECM Const CFM Fan Motor						
Fan Motor Type/Speeds	NA	NA	NA	ECM Const CFM/3-Speed		
Fan Motor (hp)	NA	NA	NA	1 / 3	1 / 3	1 / 3
Water Connection Size						
FPT	3/4	3/4	3/4	3/4	3/4	3/4
Coaxial Coil Volume (gal)	0.15	0.15	0.31	0.31	0.31	0.48
Vertical Cabinet						
Refrigeration Charge (oz)	29	31	46	35	35	65
Air Coil Dimensions (HxL)	12 x 16.5	12 x 16.5	16 x 16.5	16.5 x 20	16.5 x 20	24 x 21
Standard Filter - 1-in. Throwaway (HxL)	15 x 20	15 x 20	18 x 20	20 x 20	20 x 20	24 x 24
Operating Weight (lbs)	140	154	166	191	195	229
Shipping Weight (lbs)	160	174	186	208	212	242
Horizontal Cabinet						
Refrigeration Charge (oz)	29	31	46	35	35	65
Air Coil Dimensions (HxL)	12 x 16.5	12 x 16.5	16 x 16.5	18 x 18.5	18 x 18.5	18 x 28
Standard Filter - 1-in. Throwaway (HxL)	15 x 20	15 x 20	18 x 20	18 x 20	18 x 20	20 x 30
Operating Weight (lbs)	165	172	173	190	198	307
Shipping Weight (lbs)	185	192	205	218	222	340

50PS UNIT SIZE	030	036	042	048	060	070
Compressor Type	Scroll					
Maximum Water Working Pressure (psig/kPa)	400/3100	400/3100	400/3100	400/3100	400/3100	400/3100
Standard Fan Motor and Blower						
Fan Motor Type/Speeds	Const Torque/3-Speed					
Fan Motor (hp)	1/2	3/4	3/4	3/4	1	1
Blower Wheel Size (Diameter x Width)	9 x 7	9 x 7	10 x 8	10 x 8	11 x 9	11 x 9
ECM Const CFM Fan Motor						
Fan Motor Type/Speeds	ECM Const CFM/3-Speed					
Fan Motor (hp)	1/2	3/4	3/4	3/4	1	1
Water Connection Size						
FPT	1	1	1	1	1	1
Coaxial Coil Volume (gal)	0.39	0.62	0.62	0.62	0.62	0.85
Vertical Cabinet						
Refrigeration Charge (oz)	71	68	83	86	92	127
Air Coil Dimensions (HxL)	24 x 27	24 x 27	32 x 27	32 x 27	40 x 27	40 x 27
Standard Filter - 1-in. Throwaway (HxL)	24 x 30	24 x 30	16 x 30 (2)	16 x 30 (2)	20 x 30 (2)	20 x 30 (2)
Operating Weight (lbs)	269	281	334	340	396	444
Shipping Weight (lbs)	292	304	360	366	422	470
Horizontal Cabinet						
Refrigeration Charge (oz)	71	71	80	82	90	127
Air Coil Dimensions (HxL)	20 x 32.5	20 x 32.5	20 x 43.25	20 x 43.25	20 x 54	20 x 54
Standard Filter - 1-in. Throwaway (HxL)	20 x 34.5	20 x 34.5	20 x 24 (2)	20 x 24 (2)	20 x 28 (2)	20 x 28 (2)
Operating Weight (lbs)	358	369	400	405	452	494
Shipping Weight (lbs)	404	415	465	470	520	562

Options and accessories



Factory-installed options

Cupronickel heat exchangers are available for higher corrosion protection for applications such as open tower, geothermal, etc. Consult the water quality guidelines for proper application and selection of this option.

Sound attenuation package (mute package) is available for applications that require especially low noise levels. With this option, a double application of sound attenuating material is applied, access panels are double dampened with 1/2-in. thick density fiberglass insulation is applied to the basepan, and a unique application of special dampening material is applied to the curved portion of the blower. The mute package in combination with standard unit noise reduction features as mentioned previously provides sound levels and noise reduction to the highest degree. For additional sound attenuation, a high density compressor blanket is available as an option on unit sizes 018 and above.

Extended range units have an insulated coaxial coil and insulated refrigerant and water piping to prevent condensation, and therefore potential dripping problems, in applications where the entering water temperature is below the normal operating range (less than 60 F). Units are capable of operating with an entering water temperature range of 25 to 110 F.

Hot water generator coil and 125 F high temperature switch to generate hot water using the unit. Hot water pumps are not provided with this option.

Hot gas reheat (HGR) allows the user to control not only space temperature, but also humidity levels within the conditioned space. Excessive moisture in the space can promote mold growth leading to damage in the structure or interior surfaces, as well as reducing the air quality and creating an unhealthy environment.

Typical unit control is by a wall-mounted thermostat that senses temperature in the occupied space. By utilizing a humidistat in addition to the thermostat, we are able to monitor the humidity levels in the space as well. The HGR option allows cooling and dehumidification to satisfy both the thermostat and humidistat while preventing over cooling of the space while in the dehumidification mode.

Water circuit options provide internally mounted 2.5 or 3.0 gpm per ton automatic flow regulating valves for easier installation.

Two-way motorized control valve can be provided for applications involving open type systems or variable speed pumping. This valve will slowly open and close in conjunction with the compressor operation to shut off or turn on water to the unit.

Electronically commutated motors (ECM) provide soft starting, maintain constant airflow over the motor static operating range, and provide airflow adjustment on the motor control board. The fan motor is isolated from the housing by rubber grommets, is permanently lubricated and has thermal overload protection.

Evaporator coil protection — Optional tin electroplated copper tubing with high-tech polymer coated aluminum fins will protect the evaporator coil from all forms of corrosive elements in the airstream.

Field-installed accessories

WSHP Open multiple protocol controller is a proactive controller capable of communicating BACnet, Modbus, N2, and LON (with a separate card) protocols. The controller is designed to allow users access and ability to change and configure multiple settings and features including indoor air quality (IAQ), waterside economizer controls, etc.

50PSH007-070 UNITS

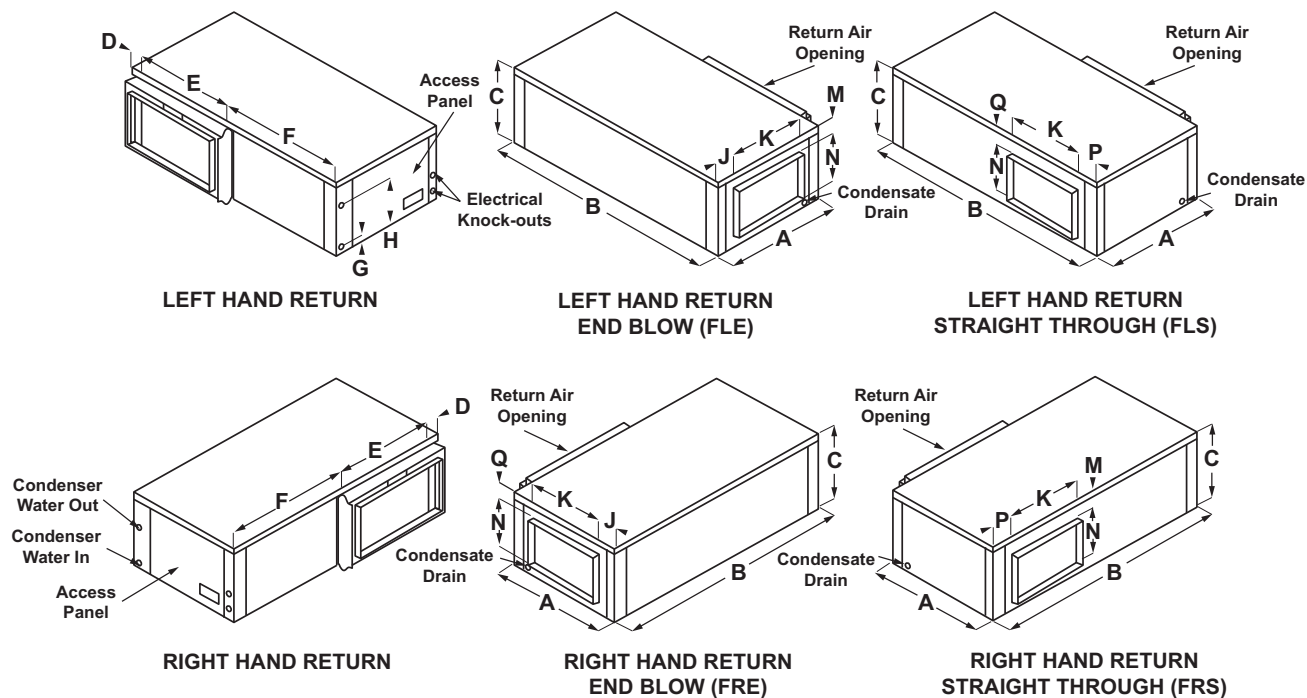
UNIT	A	B	C	D	E	F	G	H	J	K	M	N	P	Q	R	T	CONDENSER WATER CONNECTIONS	RECOMMENDED REPLACEMENT NOMINAL FILTER SIZE
	WIDTH	DEPTH	HEIGHT	CAB END TO FILTER RACK	R/A DUCT WIDTH	CAB FRONT TO FILTER RACK	WATER IN	WATER OUT	SIDE TO DISC.	DISC. WIDTH	TOP TO DISC. (FLE AND FRS)	DISC. HEIGHT	END TO DISC.	TOP TO DISC. (FRE AND FLS)	FILTER RACK HEIGHT	R/A DUCT FLANGE HEIGHT		
007	21.75	43.25	16.75	0.50	20.25	22.25	2.25	13.87	3.50	11.75	4.62	7.75	3.50	4.62	15.00	13.00	3/4 FPT	15 x 20 x 1
009	21.75	43.25	16.75	0.50	20.25	22.25	2.25	13.87	3.50	11.75	4.62	7.75	3.50	4.62	15.00	13.00	3/4 FPT	15 x 20 x 1
012	22.25	45.25	19.75	0.62	20.25	24.25	2.50	12.50	3.62	11.75	7.12	7.75	3.62	4.75	18.00	16.00	3/4 FPT	18 x 20 x 1
015	22.25	45.25	19.75	1.62	20.25	23.25	2.50	12.50	2.75	13.75	3.12	13.75	2.75	2.87	18.00	16.00	3/4 FPT	18 x 20 x 1
018	22.25	45.25	19.75	1.62	20.25	23.25	2.50	12.50	2.75	13.75	3.12	13.75	2.75	2.87	18.00	16.00	3/4 FPT	18 x 20 x 1
024	26.25	54.75	22.00*	1.25	30.25	23.00	2.62	15.12	3.75	13.75	2.12	15.75	3.75	4.25	20.12	18.00	3/4 FPT	20 x 30 x 1
030	30.25	68.25	22.00*	2.00	35.00	31.25	2.50	13.25	4.50	15.75	4.00	15.75	4.50	2.25	20.12	18.00	1 FPT	20 x 34.5 x 1
036	30.25	68.25	22.00*	2.00	35.00	31.25	2.50	13.25	4.50	15.75	4.00	15.75	4.50	2.25	20.12	18.00	1 FPT	20 x 34.5 x 1
042	30.25	79.00	22.00*	0.75	48.25	29.62	2.75	13.25	4.50	17.75	2.25	17.75	4.50	2.12	20.12	18.00	1 FPT	20 x 24 x 1 (2)
048	30.25	79.00	22.00*	0.75	48.25	29.62	2.75	13.25	4.50	17.75	2.25	17.75	4.50	2.12	20.12	18.00	1 FPT	20 x 24 x 1 (2)
060	30.25	89.25	22.00*	1.87	56.25	31.00	2.62	13.25	4.50	17.75	2.25	17.75	4.50	2.12	20.12	18.00	1 FPT	20 x 28 x 1 (2)
070	30.25	89.25	22.00*	1.87	56.25	31.00	5.75	17.75	4.87	17.75	2.62	17.75	4.87	1.75	20.12	18.00	1 FPT	20 x 28 x 1 (2)

NOTE: All dimensions in inches unless otherwise noted. All dimensions within ± 0.125 -in. Specifications subject to change without notice.

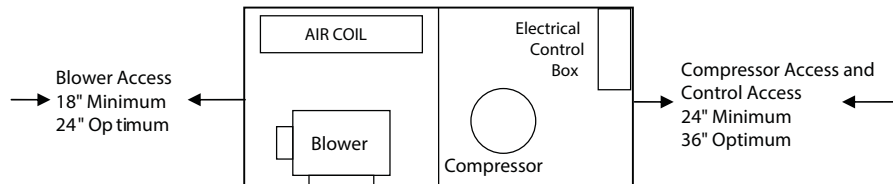
*Total unit height is 22.75 with base rails for 030-070 units.

LEGEND

- FLE** — Front Water, Left Return, End Supply
- FLS** — Front Water, Left Return, Straight Through Supply
- FRE** — Front Water, Right Return, End Supply
- FRS** — Front Water, Right Return, Straight Through Supply



SERVICE CLEARANCES



NOTE: The local electric codes may require 36-in. or more clearance at the electrical control box.

Dimensions (cont)

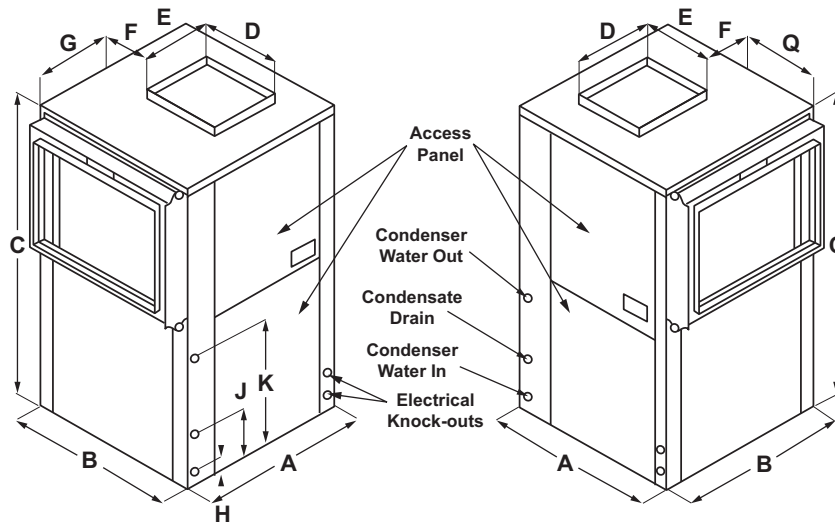
50PSV007-070 UNITS

UNIT	A	B	C	D	E	F	G	H	J	K	M	N	P	Q	CONDENSER WATER CONN.	RECOMMENDED REPLACEMENT NOMINAL FILTER SIZE
	WIDTH	DEPTH	HEIGHT	DISCHARGE DEPTH	DISCHARGE WIDTH	CABINET EDGE TO DISCHARGE	LEFT SIDE TO DISC.	WATER IN	BOTTOM TO COND. DRAIN	WATER OUT	R/A DUCT WIDTH	R/A DUCT FLANGE HEIGHT	FILTER RACK HEIGHT	RIGHT SIDE TO DISCHARGE		
007	21.75	21.75	32.75	11.75	7.75	5.00	8.50	2.25	8.00	13.75	18.00	13.00	15.00	8.50	3/4 FPT	15 x 20 x 1
009	21.75	21.75	32.75	11.75	7.75	5.00	8.50	2.25	8.00	13.75	18.00	13.00	15.00	8.50	3/4 FPT	15 x 20 x 1
012	21.75	21.75	32.75	11.75	7.75	5.00	8.50	2.62	7.50	12.50	18.00	16.00	18.00	8.50	3/4 FPT	18 x 20 x 1
015	21.75	21.75	39.25	13.75	13.75	4.00	6.12	2.25	7.50	12.25	18.00	18.00	20.00	4.00	3/4 FPT	20 x 20 x 1
018	21.75	21.75	39.25	13.75	13.75	4.00	6.12	2.25	7.50	12.25	18.00	18.00	20.00	4.00	3/4 FPT	20 x 20 x 1
024	21.75	26.25	47.25	13.75	15.75	6.25	4.87	2.50	8.75	15.00	22.00	22.00	24.00	4.00	3/4 FPT	24 x 24 x 1
030	24.25	33.50	47.25	15.75	15.75	8.87	7.00	2.50	8.50	14.50	28.00	22.00	24.00	4.00	1 FPT	24 x 30 x 1
036	24.25	33.50	47.25	15.75	15.75	8.87	7.00	2.50	8.50	14.50	28.00	22.00	24.00	4.00	1 FPT	24 x 30 x 1
042	26.25	33.50	58.25	17.75	17.75	7.87	6.75	3.25	8.50	13.25	28.00	30.00	32.00	4.00	1 FPT	16 x 30 x 1 (2)
048	26.25	33.50	58.25	17.75	17.75	7.87	6.75	3.25	8.50	13.25	28.00	30.00	32.00	4.00	1 FPT	16 x 30 x 1 (2)
060	26.25	33.50	66.25	17.75	17.75	7.87	7.00	3.25	8.50	13.25	28.00	38.00	40.00	4.00	1 FPT	20 x 30 x 1 (2)
070	26.25	33.50	66.25	17.75	17.75	7.87	7.25	4.25	10.00	17.00	28.00	38.00	40.00	3.00	1 FPT	20 x 30 x 1 (2)

NOTE: All dimensions in inches unless otherwise noted. All dimensions within ± 0.125 -in. Specifications subject to change without notice.

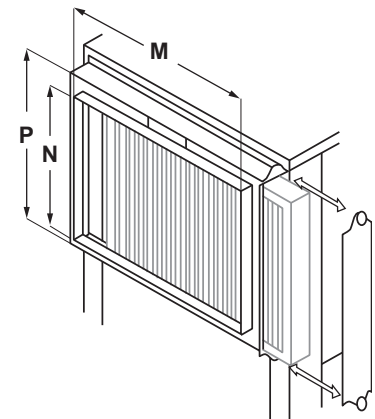
LEGEND

- FLE** — Front Water, Left Return, End Supply
- FLS** — Front Water, Left Return, Straight Through Supply
- FRE** — Front Water, Right Return, End Supply
- FRS** — Front Water, Right Return, Straight Through Supply



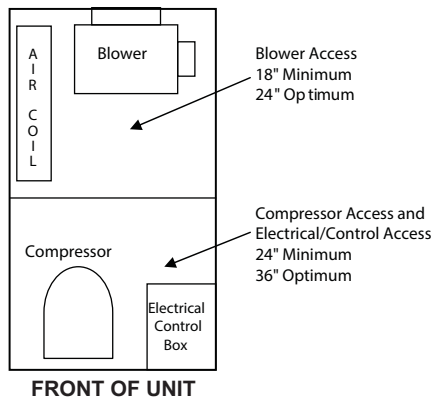
LEFT HAND RETURN (FLT)

RIGHT HAND RETURN (FRT)



RETURN AIR (FILTER) VIEW

SERVICE CLEARANCES



FRONT OF UNIT

NOTE: The local electric codes may require 36-in. or more clearance at the electrical control box.

50PSH007-070 CORNER WEIGHTS

CONFIGURATIONS		LEFT HAND EVAPORATOR				RIGHT HAND EVAPORATOR			
MODEL	TOTAL lbs	LEFT FRONT* lbs	RIGHT FRONT* lbs	LEFT BACK lbs	RIGHT BACK lbs	LEFT FRONT* lbs	RIGHT FRONT* lbs	LEFT BACK lbs	RIGHT BACK lbs
007	165	40	42	42	41	39	43	39	44
009	172	42	44	44	42	41	45	41	45
012	173	46	42	45	40	44	44	40	45
015	190	45	45	53	47	46	44	47	53
018	198	51	49	50	48	49	51	47	51
024	307	80	78	79	70	77	81	68	81
030	358	99	88	92	79	96	92	78	92
036	369	100	92	94	83	96	96	81	96
042	400	107	99	105	89	103	103	88	106
048	405	106	108	102	89	102	112	85	106
060	452	116	118	118	100	111	123	95	123
070	494	155	122	121	96	151	126	98	119

* Front is control box end.

LEGEND AND NOTES FOR PAGES 12-23

LEGEND

COP — Coefficient of Performance
EER — Energy Efficiency Ratio
EWT — Entering Water Temperature (F)
FOH — Feet of Heat
MBtuh — Btuh in Thousands

NOTES:

1. Interpolation is permissible; extrapolation is not.
2. AHRI/ISO certified conditions are 80.6 F db and 66.2 F wb in cooling and 68 F db in heating.
3. Table does not reflect fan or pump power corrections for AHRI/ISO conditions.
4. Operation below 40 F EWT is based on a 15% antifreeze solution.
5. See Carrier WSHP Builder selection software for operating conditions other than those listed.

Performance data



50PSH,PSV007 — 300 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	1.5	3.1	75/63	7.9	6.7	8.9	0.32	25.0	30	60	5.2	4.0	0.40	3.8
			80/67	8.5	7.0	9.4	0.31	27.7		70	5.0	3.8	0.44	3.4
			85/71	9.0	7.2	10.0	0.30	30.4		80	4.8	3.5	0.47	3.0
	2.0	5.2	75/63	8.0	6.7	9.0	0.31	26.0		60	5.3	4.1	0.40	3.9
			80/67	8.6	7.0	9.5	0.30	29.0		70	5.1	3.8	0.44	3.5
			85/71	9.2	7.2	10.1	0.28	32.4		80	4.9	3.5	0.47	3.1
	3.0	10.8	75/63	8.1	6.8	9.1	0.29	27.5		60	5.4	4.2	0.40	4.0
			80/67	8.7	7.0	9.6	0.28	30.7		70	5.2	3.9	0.44	3.5
			85/71	9.3	7.3	10.2	0.27	34.3		80	5.0	3.6	0.47	3.1
60	1.5	3.0	75/63	7.5	6.5	8.6	0.36	20.6	40	60	6.1	4.9	0.41	4.4
			80/67	8.0	6.8	9.1	0.35	22.5		70	5.9	4.6	0.44	3.9
			85/71	8.6	7.0	9.6	0.35	24.8		80	5.7	4.2	0.48	3.5
	2.0	5.0	75/63	7.6	6.6	8.7	0.35	21.4		60	6.2	5.0	0.41	4.5
			80/67	8.1	6.8	9.2	0.35	23.4		70	6.0	4.7	0.44	4.0
			85/71	8.7	7.0	9.7	0.33	25.9		80	5.8	4.3	0.48	3.6
	3.0	10.4	75/63	7.7	6.6	8.7	0.34	22.5		60	6.4	5.2	0.41	4.6
			80/67	8.2	6.9	9.3	0.33	24.7		70	6.1	4.8	0.44	4.1
			85/71	8.8	7.1	9.8	0.32	27.3		80	5.9	4.4	0.48	3.6
70	1.5	2.9	75/63	7.1	6.3	8.3	0.41	17.2	50	60	7.0	5.8	0.41	5.1
			80/67	7.6	6.6	8.8	0.40	18.7		70	6.8	5.4	0.45	4.5
			85/71	8.1	6.9	9.3	0.40	20.3		80	6.5	5.1	0.49	3.9
	2.0	4.9	75/63	7.2	6.4	8.3	0.40	17.9		60	7.2	6.0	0.41	5.2
			80/67	7.7	6.6	8.9	0.39	19.5		70	6.9	5.6	0.45	4.5
			85/71	8.2	6.9	9.4	0.39	21.1		80	6.7	5.2	0.49	4.0
	3.0	10.1	75/63	7.3	6.4	8.4	0.39	18.7		60	7.4	6.1	0.41	5.3
			80/67	7.8	6.7	8.9	0.38	20.4		70	7.1	5.7	0.45	4.7
			85/71	8.3	6.9	9.5	0.37	22.2		80	6.8	5.3	0.49	4.1
80	1.5	2.8	75/63	6.6	6.2	7.9	0.46	14.3	60	60	8.0	6.8	0.41	5.8
			80/67	7.1	6.4	8.4	0.46	15.5		70	7.7	6.4	0.45	5.0
			85/71	7.6	6.7	8.9	0.45	16.8		80	7.5	5.9	0.49	4.5
	2.0	4.7	75/63	6.7	6.2	8.0	0.45	14.8		60	8.2	7.0	0.41	5.9
			80/67	7.2	6.5	8.5	0.44	16.1		70	7.9	6.5	0.45	5.2
			85/71	7.7	6.7	9.0	0.44	17.5		80	7.6	6.1	0.50	4.5
	3.0	9.7	75/63	6.8	6.3	8.1	0.44	15.4		60	8.4	7.2	0.41	6.1
			80/67	7.3	6.5	8.6	0.43	16.8		70	8.1	6.7	0.45	5.3
			85/71	7.8	6.8	9.1	0.43	18.2		80	7.8	6.3	0.50	4.6
85	1.5	2.8	75/63	6.4	6.1	7.8	0.48	13.2	70	60	9.0	7.8	0.41	6.5
			80/67	6.9	6.3	8.3	0.48	14.3		70	8.7	7.3	0.45	5.7
			85/71	7.3	6.6	8.7	0.48	15.3		80	8.4	6.8	0.50	5.0
	2.0	4.6	75/63	6.5	6.1	7.9	0.47	13.6		60	9.2	8.0	0.41	6.7
			80/67	7.0	6.4	8.3	0.47	14.8		70	8.9	7.5	0.45	5.8
			85/71	7.4	6.6	8.8	0.47	15.8		80	8.6	7.0	0.50	5.1
	3.0	9.6	75/63	6.6	6.2	7.9	0.46	14.2		60	9.4	8.2	0.41	6.8
			80/67	7.1	6.4	8.4	0.46	15.4		70	9.1	7.7	0.45	5.9
			85/71	7.6	6.7	8.9	0.45	16.7		80	8.8	7.2	0.50	5.2
90	1.5	2.7	75/63	6.2	6.0	7.6	0.51	12.1	80	60	10.0	8.8	0.40	7.3
			80/67	6.6	6.3	8.1	0.51	12.9		70	9.6	8.3	0.45	6.2
			85/71	7.1	6.5	8.6	0.50	14.0		80	9.3	7.8	0.50	5.4
	2.0	4.6	75/63	6.3	6.0	7.7	0.50	12.6		60	10.2	9.1	0.40	7.4
			80/67	6.7	6.3	8.2	0.50	13.5		70	9.9	8.5	0.45	6.4
			85/71	7.2	6.5	8.6	0.49	14.6		80	9.5	8.0	0.50	5.6
	3.0	9.4	75/63	6.4	6.1	7.8	0.49	13.0		60	10.5	9.3	0.40	7.7
			80/67	6.8	6.3	8.2	0.48	14.0		70	10.1	8.8	0.45	6.6
			85/71	7.3	6.6	8.7	0.48	15.2		80	9.8	8.2	0.50	5.7
100	1.5	2.6	75/63	5.8	5.9	7.3	0.56	10.3	Operation Not Recommended					
			80/67	6.2	6.1	7.8	0.56	11.0						
			85/71	6.6	6.3	8.2	0.56	11.8						
	2.0	4.4	75/63	5.8	5.9	7.4	0.55	10.5						
			80/67	6.3	6.1	7.8	0.55	11.5						
			85/71	6.7	6.4	8.3	0.55	12.2						
	3.0	9.2	75/63	5.9	5.9	7.4	0.54	10.9						
			80/67	6.4	6.2	7.9	0.54	11.9						
			85/71	6.8	6.4	8.3	0.53	12.7						
110	1.5	2.6	75/63	5.4	5.4	7.1	0.61	8.8						
			80/67	5.7	5.7	7.4	0.61	9.3						
			85/71	6.1	6.2	7.8	0.61	9.9						
	2.0	4.3	75/63	5.4	5.4	7.1	0.60	9.0						
			80/67	5.8	6.0	7.5	0.60	9.6						
			85/71	6.2	6.2	7.9	0.60	10.3						
	3.0	8.9	75/63	5.5	5.5	7.2	0.59	9.3						
			80/67	5.9	6.0	7.6	0.59	9.9						
			85/71	6.3	6.3	8.0	0.59	10.6						

See Legend on page 11.

50PSH,PSV009 — 325 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	1.5	2.5	75/63	10.0	7.8	11.3	0.39	25.9	30	60	6.9	5.2	0.52	3.8
			80/67	10.7	8.1	12.0	0.38	28.5		70	6.7	4.9	0.57	3.4
			85/71	11.4	8.3	12.7	0.37	31.4		80	6.6	4.6	0.62	3.1
	2.5	6.2	75/63	10.3	7.9	11.5	0.36	29.1		60	7.1	5.5	0.53	3.9
			80/67	11.0	8.2	12.2	0.34	32.4		70	6.9	5.1	0.58	3.5
			85/71	11.7	8.4	12.9	0.33	36.1		80	6.8	4.8	0.62	3.2
	3.5	11.3	75/63	10.4	8.0	11.5	0.34	30.5		60	7.3	5.6	0.53	4.0
			80/67	11.1	8.2	12.2	0.33	34.1		70	7.1	5.2	0.58	3.6
			85/71	11.9	8.5	13.0	0.31	38.7		80	6.9	4.9	0.63	3.2
60	1.5	2.4	75/63	9.5	7.6	11.0	0.45	21.1	40	60	8.0	6.3	0.54	4.4
			80/67	10.2	7.9	11.6	0.44	23.1		70	7.8	5.9	0.59	3.9
			85/71	10.8	8.1	12.3	0.43	25.0		80	7.6	5.5	0.64	3.5
	2.5	6.0	75/63	9.7	7.7	11.1	0.42	23.1		60	8.3	6.6	0.54	4.5
			80/67	10.4	8.0	11.8	0.41	25.5		70	8.1	6.2	0.59	4.0
			85/71	11.1	8.2	12.5	0.40	28.1		80	7.9	5.8	0.64	3.6
	3.5	10.9	75/63	9.8	7.8	11.2	0.41	24.0		60	8.5	6.8	0.54	4.6
			80/67	10.6	8.0	11.9	0.40	26.9		70	8.2	6.3	0.59	4.0
			85/71	11.3	8.3	12.6	0.38	29.9		80	8.0	5.9	0.65	3.6
70	1.5	2.3	75/63	9.0	7.4	10.6	0.52	17.5	50	60	9.1	7.4	0.54	4.9
			80/67	9.6	7.7	11.3	0.51	18.9		70	8.9	7.0	0.60	4.3
			85/71	10.3	7.9	11.9	0.50	20.6		80	8.7	6.5	0.66	3.9
	2.5	5.8	75/63	9.2	7.5	10.8	0.49	18.9		60	9.6	7.8	0.55	5.1
			80/67	9.9	7.8	11.4	0.48	20.8		70	9.3	7.3	0.61	4.5
			85/71	10.5	8.0	12.1	0.47	22.6		80	9.0	6.9	0.66	4.0
	3.5	10.6	75/63	9.3	7.5	10.9	0.48	19.6		60	9.8	8.0	0.55	5.2
			80/67	10.0	7.8	11.5	0.47	21.6		70	9.5	7.5	0.61	4.6
			85/71	10.7	8.0	12.2	0.45	23.7		80	9.2	7.0	0.67	4.0
80	1.5	2.2	75/63	8.5	7.2	10.3	0.58	14.7	60	60	10.3	8.5	0.55	5.4
			80/67	9.1	7.4	10.9	0.58	15.8		70	10.1	8.1	0.61	4.8
			85/71	9.7	7.7	11.5	0.57	17.0		80	9.8	7.6	0.68	4.2
	2.5	5.6	75/63	8.7	7.3	10.5	0.56	15.7		60	10.8	9.0	0.56	5.7
			80/67	9.3	7.5	11.1	0.55	17.1		70	10.5	8.5	0.62	5.0
			85/71	10.0	7.8	11.7	0.54	18.6		80	10.2	8.0	0.68	4.4
	3.5	10.2	75/63	8.8	7.3	10.5	0.55	16.2		60	11.1	9.3	0.56	5.8
			80/67	9.4	7.6	11.1	0.54	17.6		70	10.7	8.7	0.62	5.0
			85/71	10.1	7.8	11.8	0.53	19.3		80	10.4	8.2	0.68	4.4
85	1.5	2.2	75/63	8.2	7.1	10.1	0.62	13.4	70	60	11.5	9.7	0.56	6.0
			80/67	8.8	7.4	10.7	0.61	14.4		70	11.2	9.2	0.62	5.2
			85/71	9.4	7.6	11.3	0.61	15.5		80	10.9	8.7	0.69	4.6
	2.5	5.5	75/63	8.4	7.2	10.3	0.59	14.3		60	12.1	10.3	0.56	6.3
			80/67	9.0	7.4	10.9	0.58	15.5		70	11.8	9.7	0.63	5.5
			85/71	9.7	7.7	11.5	0.58	16.9		80	11.4	9.1	0.70	4.8
	3.5	10.1	75/63	8.5	7.2	10.3	0.58	14.7		60	12.4	10.6	0.56	6.4
			80/67	9.1	7.5	10.9	0.57	16.0		70	12.0	10.0	0.63	5.6
			85/71	9.8	7.7	11.6	0.56	17.5		80	11.7	9.4	0.70	4.9
90	1.5	2.2	75/63	8.0	7.0	10.0	0.65	12.4	80	60	12.7	10.9	0.56	6.6
			80/67	8.5	7.3	10.5	0.65	13.2		70	12.4	10.4	0.63	5.7
			85/71	9.1	7.5	11.1	0.65	14.2		80	12.1	9.8	0.70	5.0
	2.5	5.4	75/63	8.2	7.0	10.1	0.63	13.2		60	13.4	11.6	0.56	7.0
			80/67	8.7	7.3	10.7	0.62	14.1		70	13.0	11.0	0.64	6.0
			85/71	9.4	7.6	11.3	0.61	15.4		80	12.7	10.3	0.71	5.2
	3.5	9.9	75/63	8.2	7.1	10.1	0.62	13.4		60	13.7	12.0	0.56	7.1
			80/67	8.8	7.4	10.7	0.61	14.5		70	13.3	11.3	0.64	6.1
			85/71	9.5	7.6	11.4	0.60	15.9		80	12.9	10.6	0.71	5.3
100	1.5	2.1	75/63	7.4	6.7	9.6	0.72	10.4	Operation Not Recommended					
			80/67	8.0	7.0	10.2	0.72	11.2						
			85/71	8.5	7.3	10.7	0.72	11.9						
	2.5	5.3	75/63	7.6	6.8	9.7	0.70	11.0						
			80/67	8.2	7.1	10.3	0.69	11.9						
			85/71	8.7	7.4	10.9	0.69	12.7						
	3.5	9.6	75/63	7.7	6.8	9.8	0.69	11.3						
			80/67	8.3	7.1	10.4	0.68	12.2						
			85/71	8.8	7.4	10.9	0.68	13.0						
110	1.5	2.0	75/63	6.9	6.6	9.3	0.79	8.8						
			80/67	7.4	6.8	9.8	0.79	9.4						
			85/71	7.9	7.1	10.3	0.79	10.0						
	2.5	5.1	75/63	7.0	6.6	9.4	0.77	9.2						
			80/67	7.6	6.9	9.9	0.77	10.0						
			85/71	8.1	7.1	10.5	0.77	10.6						
	3.5	9.4	75/63	7.1	6.6	9.4	0.76	9.4						
			80/67	7.6	6.9	9.9	0.76	10.1						
			85/71	8.2	7.2	10.5	0.76	10.9						

See Legend on page 11.

Performance data (cont)



50PSH,PSV012 — 400 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	3.0	3.7	75/63	13.7	10.2	15.5	0.55	24.7	30	60	9.7	7.3	0.75	3.8
			80/67	14.7	10.5	16.5	0.54	27.1		70	9.5	6.9	0.81	3.4
			85/71	15.7	10.7	17.5	0.53	29.6		80	9.3	6.5	0.87	3.1
	4.0	6.2	75/63	13.9	10.2	15.6	0.54	25.9		60	9.9	7.5	0.76	3.8
			80/67	14.9	10.5	16.6	0.52	28.6		70	9.7	7.1	0.82	3.5
			85/71	15.9	10.8	17.6	0.51	31.4		80	9.5	6.6	0.88	3.2
	6.0	12.8	75/63	14.0	10.3	15.7	0.52	27.1		60	10.2	7.7	0.76	3.9
			80/67	15.1	10.6	16.7	0.50	30.2		70	9.9	7.3	0.82	3.5
			85/71	16.1	10.9	17.7	0.48	33.3		80	9.7	6.8	0.88	3.2
60	3.0	3.6	75/63	13.1	9.9	15.1	0.63	20.7	40	60	11.3	8.8	0.77	4.3
			80/67	14.0	10.2	16.0	0.62	22.4		70	11.0	8.3	0.84	3.8
			85/71	15.0	10.5	16.9	0.62	24.4		80	10.8	7.8	0.91	3.5
	4.0	6.0	75/63	13.2	9.9	15.2	0.62	21.4		60	11.6	9.0	0.78	4.4
			80/67	14.1	10.3	16.1	0.60	23.3		70	11.3	8.5	0.84	3.9
			85/71	15.1	10.6	17.1	0.59	25.5		80	11.0	8.0	0.91	3.5
	6.0	12.4	75/63	13.4	10.0	15.3	0.60	22.4		60	11.8	9.3	0.78	4.4
			80/67	14.3	10.3	16.2	0.59	24.4		70	11.5	8.7	0.85	4.0
			85/71	15.3	10.6	17.2	0.57	26.8		80	11.2	8.2	0.92	3.6
70	3.0	3.4	75/63	12.4	9.6	14.6	0.71	17.3	50	60	12.9	10.3	0.80	4.7
			80/67	13.3	9.9	15.5	0.71	18.8		70	12.6	9.8	0.87	4.2
			85/71	14.2	10.2	16.4	0.70	20.2		80	12.3	9.2	0.94	3.8
	4.0	5.8	75/63	12.5	9.7	14.7	0.70	17.9		60	13.3	10.6	0.80	4.9
			80/67	13.4	10.0	15.6	0.69	19.4		70	12.9	10.0	0.87	4.3
			85/71	14.3	10.3	16.5	0.68	21.0		80	12.6	9.5	0.95	3.9
	6.0	12.0	75/63	12.6	9.7	14.8	0.68	18.5		60	13.6	11.0	0.80	4.9
			80/67	13.6	10.0	15.7	0.67	20.2		70	13.2	10.3	0.88	4.4
			85/71	14.5	10.3	16.7	0.66	21.9		80	12.9	9.7	0.95	4.0
80	3.0	3.3	75/63	11.7	9.3	14.1	0.80	14.7	60	60	14.7	12.0	0.82	5.3
			80/67	12.5	9.6	15.0	0.79	15.7		70	14.3	11.4	0.90	4.7
			85/71	13.4	9.9	15.9	0.79	16.9		80	13.9	10.7	0.98	4.2
	4.0	5.6	75/63	11.8	9.3	14.2	0.78	15.1		60	15.0	12.4	0.82	5.3
			80/67	12.6	9.7	15.1	0.78	16.2		70	14.7	11.7	0.90	4.8
			85/71	13.5	10.0	16.0	0.77	17.5		80	14.3	11.0	0.98	4.3
	6.0	11.6	75/63	11.9	9.4	14.3	0.77	15.5		60	15.5	12.7	0.83	5.5
			80/67	12.8	9.7	15.2	0.76	16.8		70	15.0	12.0	0.91	4.8
			85/71	13.7	10.0	16.1	0.75	18.2		80	14.6	11.3	0.99	4.3
85	3.0	3.3	75/63	11.3	9.1	13.9	0.84	13.5	70	60	16.4	13.7	0.84	5.7
			80/67	12.1	9.4	14.7	0.84	14.4		70	16.0	13.0	0.93	5.0
			85/71	13.0	9.7	15.6	0.84	15.5		80	15.7	12.3	1.01	4.5
	4.0	5.5	75/63	11.4	9.2	14.0	0.82	13.8		60	16.9	14.2	0.85	5.8
			80/67	12.3	9.5	14.8	0.82	15.0		70	16.5	13.4	0.93	5.2
			85/71	13.1	9.8	15.7	0.82	16.0		80	16.0	12.7	1.02	4.6
	6.0	11.4	75/63	11.6	9.2	14.1	0.81	14.3		60	17.3	14.6	0.85	5.9
			80/67	12.4	9.6	14.9	0.80	15.4		70	16.9	13.8	0.94	5.3
			85/71	13.3	9.9	15.8	0.80	16.6		80	16.4	13.0	1.03	4.7
90	3.0	3.2	75/63	10.9	9.0	13.6	0.88	12.3	80	60	18.3	15.5	0.87	6.2
			80/67	11.7	9.3	14.5	0.88	13.3		70	17.8	14.8	0.96	5.5
			85/71	12.6	9.6	15.3	0.88	14.3		80	17.4	13.9	1.05	4.9
	4.0	5.4	75/63	11.1	9.0	13.7	0.87	12.8		60	18.8	16.0	0.87	6.3
			80/67	11.9	9.4	14.6	0.87	13.7		70	18.3	15.2	0.96	5.6
			85/71	12.7	9.7	15.4	0.86	14.7		80	17.9	14.3	1.06	5.0
	6.0	11.2	75/63	11.2	9.1	13.8	0.85	13.1		60	19.3	16.6	0.88	6.4
			80/67	12.0	9.4	14.7	0.85	14.1		70	18.8	15.7	0.97	5.7
			85/71	12.9	9.7	15.6	0.85	15.2		80	18.3	14.8	1.06	5.0
100	3.0	3.1	75/63	10.2	8.7	13.2	0.97	10.5	Operation Not Recommended					
			80/67	11.0	9.0	14.0	0.97	11.3						
			85/71	11.7	9.3	14.8	0.97	12.0						
	4.0	5.3	75/63	10.3	8.7	13.2	0.95	10.8						
			80/67	11.1	9.1	14.0	0.96	11.6						
			85/71	11.9	9.4	14.9	0.96	12.4						
	6.0	10.9	75/63	10.4	8.7	13.3	0.94	11.0						
			80/67	11.2	9.1	14.1	0.94	11.9						
			85/71	12.0	9.4	15.0	0.94	12.7						
110	3.0	3.0	75/63	9.5	8.4	12.7	1.06	9.0	Operation Not Recommended					
			80/67	10.2	8.7	13.4	1.06	9.6						
			85/71	10.9	9.0	14.2	1.07	10.2						
	4.0	5.1	75/63	9.6	8.4	12.7	1.04	9.2						
			80/67	10.3	8.8	13.5	1.05	9.8						
			85/71	11.0	9.1	14.3	1.05	10.4						
	6.0	10.6	75/63	9.6	8.5	12.8	1.03	9.3						
			80/67	10.4	8.8	13.6	1.04	10.0						
			85/71	11.1	9.1	14.4	1.04	10.7						

See Legend on page 11.

50PSH,PSV015 — 500 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
40	3.0	3.5	75/63	16.4	12.7	18.2	0.53	31.1	30	60	10.3	7.8	0.76	4.0
			80/67	17.5	13.1	19.2	0.51	34.2		70	10.1	7.3	0.83	3.5
			85/71	18.7	13.4	20.4	0.50	37.8		80	9.8	6.8	0.91	3.1
	4.0	5.9	75/63	16.6	12.8	18.3	0.50	33.3		60	10.5	8.0	0.76	4.0
			80/67	17.8	13.2	19.4	0.48	37.1		70	10.3	7.5	0.84	3.6
			85/71	19.0	13.6	20.5	0.46	41.4		80	10.0	6.9	0.91	3.2
	6.0	12.3	75/63	16.9	12.9	18.5	0.47	35.9		60	10.8	8.2	0.76	4.1
			80/67	18.1	13.3	19.6	0.45	40.4		70	10.5	7.7	0.84	3.6
			85/71	19.3	13.7	20.7	0.42	45.6		80	10.2	7.1	0.92	3.2
50	3.0	3.4	75/63	15.6	12.4	17.7	0.63	24.9	40	60	11.9	9.3	0.78	4.5
			80/67	16.7	12.8	18.7	0.62	27.2		70	11.8	8.8	0.86	4.0
			85/71	17.8	13.1	19.8	0.60	29.6		80	11.3	8.2	0.94	3.5
	4.0	5.7	75/63	15.8	12.5	17.8	0.60	26.3		60	12.2	9.6	0.78	4.6
			80/67	16.9	12.8	18.9	0.59	28.9		70	12.0	9.1	0.86	4.1
			85/71	18.0	13.2	19.9	0.57	31.7		80	11.5	8.4	0.95	3.5
	6.0	11.9	75/63	16.1	12.6	17.9	0.57	28.1		60	12.5	9.9	0.78	4.7
			80/67	17.2	12.9	19.0	0.56	31.0		70	12.3	9.3	0.87	4.1
			85/71	18.3	13.3	20.1	0.54	34.3		80	11.8	8.6	0.95	3.6
60	3.0	3.3	75/63	14.8	12.0	17.2	0.73	20.3	50	60	13.6	11.0	0.79	5.0
			80/67	15.8	12.4	18.2	0.72	22.0		70	13.2	10.3	0.88	4.4
			85/71	16.9	12.8	19.2	0.71	23.8		80	12.9	9.6	0.97	3.9
	4.0	5.5	75/63	15.0	12.1	17.3	0.70	21.3		60	14.0	11.3	0.79	5.1
			80/67	16.1	12.5	18.3	0.69	23.3		70	13.6	10.6	0.89	4.5
			85/71	17.1	12.9	19.4	0.68	25.2		80	13.2	9.9	0.98	3.9
	6.0	11.5	75/63	15.2	12.2	17.4	0.68	22.4		60	14.4	11.7	0.80	5.3
			80/67	16.3	12.6	18.5	0.66	24.6		70	13.9	10.9	0.89	4.6
			85/71	17.4	13.0	19.5	0.65	26.9		80	13.5	10.2	0.98	4.0
70	3.0	3.2	75/63	14.0	11.7	16.6	0.83	16.8	60	60	15.4	12.8	0.80	5.6
			80/67	15.0	12.1	17.6	0.83	18.2		70	15.0	12.0	0.90	4.9
			85/71	16.0	12.5	18.6	0.82	19.5		80	14.6	11.2	1.00	4.3
	4.0	5.4	75/63	14.2	11.8	16.8	0.81	17.6		60	15.9	13.2	0.81	5.8
			80/67	15.2	12.2	17.7	0.80	19.0		70	15.4	12.3	0.90	5.0
			85/71	16.2	12.6	18.8	0.79	20.5		80	14.9	11.6	1.00	4.3
	6.0	11.1	75/63	14.4	11.9	16.9	0.79	18.4		60	16.4	13.7	0.81	5.9
			80/67	15.4	12.3	17.9	0.78	19.9		70	15.8	12.7	0.91	5.1
			85/71	16.5	12.6	18.9	0.76	21.7		80	15.3	11.9	1.01	4.4
80	3.0	3.1	75/63	13.6	11.5	16.4	0.89	15.4	70	60	17.4	14.7	0.81	6.3
			80/67	14.5	11.9	17.3	0.88	16.5		70	16.8	13.7	0.92	5.4
			85/71	15.5	12.3	18.3	0.88	17.7		80	16.4	12.9	1.02	4.7
	4.0	5.3	75/63	13.8	11.6	16.5	0.86	16.0		60	17.9	15.2	0.81	6.4
			80/67	14.7	12.0	17.5	0.86	17.2		70	17.2	14.1	0.92	5.5
			85/71	15.7	12.4	18.5	0.85	18.5		80	16.7	13.3	1.02	4.8
	6.0	11.0	75/63	13.9	11.7	16.6	0.84	16.6		60	18.4	15.7	0.82	6.6
			80/67	14.9	12.1	17.6	0.83	18.0		70	17.7	14.6	0.92	5.6
			85/71	16.0	12.5	18.6	0.82	19.5		80	17.2	13.7	1.03	4.9
85	3.0	3.1	75/63	13.2	11.3	16.1	0.94	14.1	80	60	19.2	16.5	0.82	6.8
			80/67	14.1	11.7	17.1	0.94	15.1		70	18.6	15.5	0.93	5.9
			85/71	15.0	12.2	18.0	0.93	16.1		80	18.1	14.6	1.04	5.1
	4.0	5.2	75/63	13.3	11.4	16.2	0.92	14.5		60	19.7	17.1	0.82	7.0
			80/67	14.3	11.8	17.2	0.91	15.7		70	19.1	16.0	0.93	6.0
			85/71	15.3	12.2	18.2	0.91	16.9		80	18.6	15.0	1.04	5.2
	6.0	10.8	75/63	13.5	11.5	16.3	0.90	15.1		60	20.3	17.5	0.82	7.2
			80/67	14.5	11.9	17.3	0.89	16.4		70	19.6	16.5	0.94	6.1
			85/71	15.5	12.3	18.3	0.88	17.7		80	19.0	15.5	1.05	5.3
90	3.0	3.0	75/63	12.3	11.0	15.6	1.05	11.8	Operation Not Recommended					
			80/67	13.2	11.4	16.5	1.05	12.6						
			85/71	14.1	11.8	17.4	1.05	13.5						
	4.0	5.0	75/63	12.5	11.1	15.7	1.03	12.2						
			80/67	13.4	11.5	16.6	1.03	13.1						
			85/71	14.3	11.9	17.5	1.02	14.0						
	6.0	10.5	75/63	12.6	11.1	15.8	1.01	12.5						
			80/67	13.6	11.5	16.7	1.00	13.6						
			85/71	14.5	12.0	17.7	1.00	14.6						
100	3.0	2.9	75/63	11.4	10.6	15.0	1.16	9.9						
			80/67	12.3	11.1	15.9	1.16	10.6						
			85/71	13.1	11.5	16.8	1.16	11.3						
	4.0	4.9	75/63	11.6	10.7	15.1	1.14	10.2						
			80/67	12.4	11.2	16.0	1.14	10.9						
			85/71	13.3	11.5	16.9	1.14	11.7						
	6.0	10.2	75/63	11.7	10.7	15.2	1.12	10.5						
			80/67	12.6	11.2	16.1	1.12	11.3						
			85/71	13.5	11.6	17.0	1.12	12.1						

See Legend on page 11.

Performance data (cont)



50PSH,PSV018 — 600 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	3.0	1.2	75/63	20.8	15.8	23.8	0.92	22.5	30	60	13.5	10.2	1.01	3.9
			80/67	22.2	16.3	25.1	0.89	24.8		70	13.2	9.6	1.06	3.7
			85/71	23.6	16.8	26.4	0.86	27.4		80	12.9	9.0	1.13	3.3
	5.0	3.1	75/63	21.3	16.0	24.3	0.93	22.8		60	14.1	10.8	1.03	4.0
			80/67	22.8	16.5	25.7	0.90	25.3		70	13.8	10.1	1.08	3.7
			85/71	24.2	17.0	27.1	0.86	28.2		80	13.4	9.5	1.15	3.4
	7.0	5.6	75/63	24.5	17.1	27.4	0.86	28.3		60	14.4	11.1	1.04	4.1
			80/67	21.5	16.1	24.6	0.94	22.8		70	14.0	10.4	1.09	3.8
			85/71	23.0	16.6	26.0	0.91	25.4		80	13.6	9.8	1.16	3.4
60	3.0	1.2	75/63	20.0	15.4	23.0	0.94	21.3	40	60	15.5	12.0	1.07	4.3
			80/67	21.3	15.9	24.2	0.92	23.2		70	15.1	11.4	1.12	4.0
			85/71	22.6	16.5	25.5	0.90	25.2		80	14.8	10.7	1.20	3.6
	5.0	3.0	75/63	20.4	15.7	23.4	0.93	22.0		60	16.3	12.7	1.08	4.4
			80/67	21.8	16.2	24.7	0.90	24.2		70	15.7	12.0	1.14	4.0
			85/71	23.2	16.7	26.1	0.87	26.7		80	15.4	11.3	1.22	3.7
	7.0	5.5	75/63	20.6	15.7	23.6	0.92	22.3		60	16.6	13.1	1.09	4.5
			80/67	22.1	16.2	25.0	0.90	24.7		70	16.1	12.4	1.15	4.1
			85/71	23.5	16.8	26.3	0.86	27.2		80	15.6	11.6	1.23	3.7
70	3.0	1.2	75/63	19.1	15.0	22.2	0.99	19.3	50	60	17.6	13.9	1.10	4.7
			80/67	20.3	15.6	23.4	0.98	20.7		70	17.1	13.3	1.17	4.3
			85/71	21.6	16.1	24.7	0.97	22.4		80	16.7	12.5	1.25	3.9
	5.0	2.9	75/63	19.5	15.2	22.6	0.96	20.3		60	18.5	14.8	1.11	4.9
			80/67	20.8	15.8	23.8	0.94	22.1		70	18.0	14.0	1.18	4.5
			85/71	22.2	16.3	25.1	0.92	24.1		80	17.5	13.2	1.27	4.0
	7.0	5.3	75/63	19.7	15.3	22.7	0.95	20.7		60	18.9	15.2	1.11	5.0
			80/67	21.1	15.8	24.0	0.93	22.7		70	18.3	14.4	1.19	4.5
			85/71	22.5	16.4	25.4	0.90	24.9		80	17.9	13.6	1.28	4.1
80	3.0	1.1	75/63	18.2	14.7	21.5	1.07	17.0	60	60	19.9	16.1	1.12	5.2
			80/67	19.3	15.2	22.7	1.07	18.0		70	19.2	15.2	1.20	4.7
			85/71	20.5	15.7	23.9	1.07	19.2		80	18.8	14.4	1.30	4.2
	5.0	2.8	75/63	18.6	14.8	21.8	1.03	18.0		60	20.9	17.1	1.12	5.5
			80/67	19.8	15.4	23.0	1.02	19.4		70	20.2	16.2	1.21	4.9
			85/71	21.1	15.9	24.3	1.01	20.9		80	19.7	15.2	1.32	4.4
	7.0	5.1	75/63	18.8	14.9	22.0	1.02	18.5		60	21.4	17.5	1.13	5.6
			80/67	20.0	15.5	23.2	1.00	19.9		70	20.6	16.6	1.22	5.0
			85/71	21.4	16.0	24.5	0.99	21.7		80	20.1	15.7	1.33	4.4
85	3.0	1.1	75/63	17.7	14.5	21.2	1.12	15.7	70	60	21.9	18.2	1.13	5.7
			80/67	18.9	15.0	22.4	1.12	16.8		70	21.4	17.3	1.23	5.1
			85/71	20.0	15.6	23.6	1.12	17.8		80	20.9	16.4	1.34	4.6
	5.0	2.8	75/63	18.1	14.6	21.5	1.08	16.8		60	23.2	19.4	1.14	6.0
			80/67	19.3	15.2	22.7	1.07	18.0		70	22.5	18.4	1.24	5.3
			85/71	20.5	15.7	23.9	1.06	19.3		80	21.9	17.3	1.37	4.7
	7.0	5.1	75/63	18.3	14.7	21.6	1.06	17.2		60	23.6	19.9	1.14	6.1
			80/67	19.5	15.3	22.8	1.05	18.5		70	23.0	18.8	1.25	5.4
			85/71	20.8	15.8	24.1	1.04	20.0		80	22.4	17.8	1.38	4.8
90	3.0	1.1	75/63	17.3	14.3	20.9	1.18	14.7	80	60	24.2	20.4	1.14	6.2
			80/67	18.3	14.9	22.1	1.18	15.5		70	23.7	19.4	1.26	5.5
			85/71	19.5	15.4	23.2	1.19	16.4		80	23.1	18.4	1.40	4.8
	5.0	2.7	75/63	17.6	14.4	21.2	1.13	15.5		60	25.5	21.7	1.15	6.5
			80/67	18.8	15.0	22.4	1.13	16.6		70	24.8	20.7	1.29	5.7
			85/71	20.0	15.5	23.6	1.12	17.8		80	24.2	19.5	1.44	4.9
	7.0	5.0	75/63	17.8	14.5	21.3	1.11	16.0		60	26.1	22.3	1.16	6.6
			80/67	19.0	15.0	22.5	1.11	17.1		70	25.5	21.1	1.29	5.8
			85/71	20.2	15.6	23.7	1.10	18.3		80	24.7	20.0	1.46	5.0
100	3.0	1.1	75/63	16.3	13.9	20.3	1.30	12.5	Operation Not Recommended					
			80/67	17.4	14.4	21.5	1.31	13.2						
			85/71	18.4	14.9	22.6	1.33	13.8						
	5.0	2.7	75/63	16.6	14.1	20.5	1.25	13.2						
			80/67	17.8	14.6	21.7	1.26	14.1						
			85/71	18.9	15.1	22.9	1.26	15.0						
	7.0	4.9	75/63	16.8	14.0	20.6	1.24	13.6						
			80/67	17.9	14.7	21.8	1.24	14.5						
			85/71	19.1	15.2	23.0	1.24	15.4						
110	3.0	1.0	75/63	15.3	13.5	19.8	1.43	10.7						
			80/67	16.3	14.1	20.8	1.45	11.2						
			85/71	17.3	14.6	21.9	1.47	11.7						
	5.0	2.6	75/63	15.6	13.6	19.9	1.39	11.2						
			80/67	16.7	14.2	21.1	1.40	11.9						
			85/71	17.8	14.7	22.2	1.41	12.6						
	7.0	4.7	75/63	15.7	13.7	20.0	1.37	11.4						
			80/67	16.8	14.2	21.2	1.38	12.1						
			85/71	18.0	14.7	22.3	1.39	12.9						

See Legend on page 11.

50PSH,PSV024 — 800 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	4.0	3.6	75/63	27.7	20.9	30.8	0.95	29.1	30	60	18.6	14.1	1.35	4.0
			80/67	29.5	21.4	32.7	0.95	31.1		70	18.2	13.2	1.51	3.5
			85/71	31.4	22.0	34.6	0.95	33.0		80	17.9	12.3	1.67	3.1
	6.0	7.4	75/63	28.2	21.1	31.2	0.88	32.0		60	19.2	14.7	1.36	4.1
			80/67	30.1	21.6	33.1	0.88	34.4		70	18.8	13.8	1.51	3.6
			85/71	32.0	22.2	35.0	0.87	36.8		80	18.4	12.9	1.68	3.2
	8.0	12.4	75/63	28.5	21.2	31.3	0.85	33.5		60	19.5	15.0	1.36	4.2
			80/67	30.4	21.8	33.2	0.84	36.3		70	19.1	14.1	1.52	3.7
			85/71	32.4	22.3	35.2	0.83	39.1		80	18.7	13.1	1.69	3.2
60	4.0	3.5	75/63	26.5	20.3	30.1	1.11	24.0	40	60	21.2	16.6	1.38	4.5
			80/67	28.2	20.9	31.9	1.11	25.4		70	20.8	15.7	1.54	4.0
			85/71	30.0	21.5	33.7	1.12	26.9		80	20.5	14.8	1.71	3.5
	6.0	7.2	75/63	26.9	20.5	30.4	1.05	25.8		60	22.0	17.4	1.39	4.6
			80/67	28.8	21.1	32.2	1.04	27.7		70	21.5	16.4	1.55	4.1
			85/71	30.6	21.7	34.1	1.04	29.4		80	21.2	15.4	1.73	3.6
	8.0	12.0	75/63	27.2	20.6	30.5	1.02	26.8		60	22.4	17.8	1.40	4.7
			80/67	29.1	21.2	32.4	1.01	28.9		70	21.9	16.8	1.56	4.1
			85/71	30.9	21.8	34.3	1.00	30.8		80	21.5	15.7	1.73	3.6
70	4.0	3.3	75/63	25.2	19.7	29.3	1.27	19.9	50	60	24.1	19.4	1.42	5.0
			80/67	26.9	20.4	31.0	1.27	21.2		70	23.7	18.4	1.58	4.4
			85/71	28.6	21.0	32.8	1.28	22.3		80	23.3	17.3	1.77	3.9
	6.0	6.9	75/63	25.7	19.9	29.6	1.21	21.3		60	25.0	20.3	1.43	5.1
			80/67	27.4	20.6	31.3	1.21	22.7		70	24.5	19.2	1.60	4.5
			85/71	29.2	21.1	33.2	1.21	24.1		80	24.1	18.1	1.78	4.0
	8.0	11.6	75/63	25.9	20.0	29.7	1.18	22.0		60	25.6	20.8	1.44	5.2
			80/67	27.7	20.7	31.5	1.18	23.6		70	25.0	19.7	1.61	4.5
			85/71	29.5	21.2	33.4	1.18	25.1		80	24.5	18.5	1.79	4.0
80	4.0	3.2	75/63	23.9	19.2	28.5	1.43	16.7	60	60	27.3	22.4	1.47	5.4
			80/67	25.5	19.9	30.1	1.44	17.7		70	26.7	21.2	1.64	4.8
			85/71	27.1	20.4	31.8	1.46	18.7		80	26.2	20.1	1.83	4.2
	6.0	6.7	75/63	24.3	19.4	28.7	1.37	17.7		60	28.3	23.4	1.49	5.6
			80/67	26.0	20.0	30.5	1.38	18.9		70	27.7	22.1	1.66	4.9
			85/71	27.7	20.6	32.2	1.39	20.0		80	27.2	21.0	1.85	4.3
	8.0	11.3	75/63	24.5	19.5	28.9	1.35	18.2		60	29.0	24.0	1.50	5.7
			80/67	26.3	20.1	30.6	1.35	19.5		70	28.3	22.7	1.67	5.0
			85/71	28.0	20.7	32.4	1.35	20.7		80	27.7	21.5	1.86	4.4
85	4.0	3.2	75/63	23.3	18.9	28.1	1.52	15.4	70	60	30.6	25.4	1.52	5.9
			80/67	24.8	19.5	29.7	1.53	16.2		70	29.7	24.2	1.70	5.1
			85/71	26.4	20.1	31.4	1.55	17.1		80	29.2	23.0	1.90	4.5
	6.0	6.6	75/63	23.7	19.1	28.4	1.46	16.2		60	31.7	26.8	1.55	6.0
			80/67	25.3	19.8	30.0	1.47	17.3		70	31.1	25.3	1.73	5.3
			85/71	27.0	20.3	31.8	1.48	18.3		80	30.5	24.0	1.93	4.6
	8.0	11.1	75/63	23.9	19.2	28.5	1.44	16.7		60	32.4	27.5	1.57	6.0
			80/67	25.5	19.9	30.1	1.44	17.8		70	31.8	26.1	1.76	5.3
			85/71	27.2	20.5	31.9	1.44	18.9		80	31.1	24.5	1.94	4.7
90	4.0	3.1	75/63	22.6	18.7	27.7	1.61	14.1	80	60	33.7	28.3	1.60	6.2
			80/67	24.1	19.3	29.2	1.62	14.9		70	33.1	27.1	1.78	5.4
			85/71	25.7	19.8	30.9	1.64	15.7		80	32.4	25.9	1.99	4.8
	6.0	6.5	75/63	23.0	18.8	27.9	1.55	14.8		60	35.4	30.0	1.63	6.4
			80/67	24.6	19.5	29.5	1.56	15.8		70	34.6	28.5	1.82	5.6
			85/71	26.2	20.1	31.2	1.57	16.7		80	33.8	27.0	2.02	4.9
	8.0	10.9	75/63	23.2	18.9	28.0	1.53	15.2		60	36.2	31.0	1.65	6.4
			80/67	24.8	19.5	29.7	1.53	16.2		70	35.4	29.3	1.84	5.6
			85/71	26.5	20.1	31.4	1.54	17.3		80	34.6	27.7	2.04	5.0
100	4.0	3.0	75/63	21.3	18.1	27.0	1.81	11.8	Operation Not Recommended					
			80/67	22.7	18.8	28.4	1.82	12.5						
			85/71	24.2	19.3	30.1	1.83	13.2						
	6.0	6.3	75/63	21.7	18.2	27.2	1.75	12.4						
			80/67	23.1	18.9	28.7	1.76	13.2						
			85/71	24.6	19.6	30.3	1.77	14.0						
	8.0	10.6	75/63	21.8	18.3	27.2	1.73	12.7						
			80/67	23.3	19.0	28.8	1.73	13.5						
			85/71	24.9	19.6	30.4	1.74	14.4						
110	4.0	3.0	75/63	19.9	17.6	26.3	2.02	9.9	Operation Not Recommended					
			80/67	21.4	18.2	27.8	2.03	10.6						
			85/71	22.8	18.8	29.3	2.04	11.2						
	6.0	6.1	75/63	20.3	17.7	26.5	1.97	10.3						
			80/67	21.7	18.4	27.9	1.97	11.0						
			85/71	23.2	19.0	29.5	1.98	11.7						
	8.0	10.3	75/63	20.4	17.7	26.5	1.95	10.5						
			80/67	21.9	18.4	28.0	1.95	11.3						
			85/71	23.4	19.0	29.6	1.95	12.0						

See Legend on page 11.

Performance data (cont)



50PSH,PSV030 — 1,000 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	4.0	1.3	75/63	30.0	24.0	33.8	1.17	25.6	30	60	20.3	15.0	1.42	4.2
			80/67	31.9	24.7	35.9	1.21	26.4		70	19.9	14.1	1.59	3.7
			85/71	33.8	25.4	38.0	1.26	26.8		80	19.5	12.8	1.77	3.2
	7.0	3.5	75/63	31.0	24.4	34.6	1.06	29.1		60	21.6	15.6	1.43	4.4
			80/67	32.9	25.2	36.7	1.09	30.1		70	21.0	14.4	1.59	3.9
			85/71	35.0	25.9	39.0	1.13	30.9		80	20.1	13.8	1.77	3.3
	12.0	9.1	75/63	31.6	24.7	35.0	1.00	31.5		60	22.0	16.5	1.43	4.5
			80/67	33.6	25.5	37.2	1.03	32.7		70	21.3	15.6	1.59	3.9
			85/71	35.8	26.1	39.7	1.06	33.7		80	20.7	14.4	1.77	3.4
60	4.0	1.2	75/63	28.7	23.4	32.7	1.32	21.8	40	60	22.9	17.7	1.43	4.7
			80/67	30.5	24.2	34.7	1.35	22.5		70	22.3	16.6	1.59	4.1
			85/71	32.4	24.9	36.8	1.40	23.1		80	22.1	15.4	1.78	3.7
	7.0	3.3	75/63	29.6	23.9	33.4	1.21	24.4		60	24.2	19.2	1.43	5.0
			80/67	31.5	24.7	35.5	1.24	25.4		70	23.6	17.7	1.60	4.3
			85/71	33.5	25.3	37.8	1.28	26.1		80	23.1	16.2	1.78	3.8
	12.0	8.8	75/63	30.1	24.1	33.8	1.16	26.0		60	25.3	19.8	1.44	5.2
			80/67	32.2	24.8	36.1	1.18	27.2		70	24.6	18.1	1.60	4.5
			85/71	34.2	25.6	38.3	1.22	28.1		80	23.8	17.4	1.79	3.9
70	4.0	1.2	75/63	27.4	22.9	31.6	1.47	18.6	50	60	25.9	20.8	1.44	5.3
			80/67	29.1	23.7	33.5	1.51	19.3		70	25.3	19.4	1.61	4.6
			85/71	30.9	24.4	35.6	1.55	19.9		80	24.7	18.1	1.80	4.0
	7.0	3.2	75/63	28.2	23.3	32.2	1.37	20.6		60	27.5	22.5	1.45	5.6
			80/67	30.1	24.0	34.4	1.40	21.5		70	26.8	20.8	1.62	4.8
			85/71	32.0	24.8	36.5	1.44	22.2		80	26.2	19.5	1.81	4.2
	12.0	8.5	75/63	28.7	23.5	32.6	1.32	21.8		60	28.8	23.3	1.46	5.8
			80/67	30.6	24.2	34.8	1.34	22.8		70	28.1	22.1	1.64	5.0
			85/71	32.6	25.0	37.0	1.38	23.7		80	27.0	20.6	1.82	4.3
80	4.0	1.1	75/63	26.1	22.3	30.6	1.64	15.9	60	60	29.1	24.0	1.47	5.8
			80/67	27.7	23.1	32.5	1.67	16.5		70	28.5	22.7	1.65	5.1
			85/71	29.4	23.9	34.4	1.72	17.1		80	27.8	21.1	1.84	4.4
	7.0	3.1	75/63	26.8	22.7	31.2	1.54	17.4		60	30.9	26.0	1.50	6.0
			80/67	28.6	23.5	33.1	1.57	18.2		70	30.6	25.1	1.68	5.3
			85/71	30.4	24.3	35.2	1.61	18.9		80	29.6	23.1	1.87	4.6
	12.0	8.3	75/63	27.2	22.8	31.5	1.49	18.2		60	32.4	27.1	1.53	6.2
			80/67	29.0	23.7	33.5	1.51	19.2		70	31.3	25.2	1.70	5.4
			85/71	31.0	24.4	35.7	1.55	20.0		80	30.6	23.7	1.90	4.7
85	4.0	1.1	75/63	25.4	22.1	30.0	1.72	14.7	70	60	32.5	27.3	1.53	6.2
			80/67	27.0	22.9	31.9	1.76	15.3		70	31.7	25.9	1.71	5.4
			85/71	28.7	23.7	33.9	1.81	15.9		80	31.0	24.5	1.91	4.8
	7.0	3.1	75/63	26.1	22.4	30.6	1.63	16.0		60	35.0	29.7	1.59	6.4
			80/67	27.9	23.2	32.6	1.66	16.8		70	34.3	28.2	1.78	5.7
			85/71	29.6	24.0	34.6	1.69	17.4		80	33.8	27.1	1.97	5.0
	12.0	8.1	75/63	26.5	22.5	30.9	1.58	16.7		60	36.5	30.7	1.64	6.5
			80/67	28.3	23.3	32.9	1.61	17.6		70	35.6	29.6	1.82	5.7
			85/71	30.2	24.1	35.1	1.64	18.4		80	34.6	26.8	2.00	5.1
90	4.0	1.1	75/63	24.7	21.8	29.6	1.82	13.5	80	60	36.2	30.8	1.63	6.5
			80/67	26.3	22.6	31.4	1.86	14.1		70	35.6	29.2	1.81	5.8
			85/71	28.0	23.4	33.3	1.90	14.7		80	34.6	27.5	2.00	5.1
	7.0	3.0	75/63	25.4	22.1	30.0	1.72	14.7		60	39.3	34.1	1.74	6.6
			80/67	27.1	22.9	32.0	1.75	15.5		70	38.1	31.5	1.91	5.9
			85/71	28.9	23.7	34.0	1.79	16.1		80	37.8	30.8	2.12	5.2
	12.0	8.0	75/63	25.7	22.3	30.3	1.67	15.3		60	41.1	35.0	1.81	6.6
			80/67	27.5	23.0	32.3	1.70	16.1		70	40.3	32.4	1.98	6.0
			85/71	29.3	23.9	34.4	1.73	16.9		80	39.4	25.9	2.14	5.4
100	4.0	1.1	75/63	23.3	21.2	28.6	2.03	11.5	Operation Not Recommended					
			80/67	24.9	22.0	30.4	2.06	12.1						
			85/71	26.5	22.8	32.3	2.11	12.6						
	7.0	2.9	75/63	23.9	21.5	29.0	1.93	12.4						
			80/67	25.6	22.4	30.9	1.96	13.1						
			85/71	27.3	23.1	32.9	1.99	13.7						
	12.0	7.8	75/63	24.3	21.6	29.3	1.88	12.9						
			80/67	26.0	22.5	31.2	1.91	13.6						
			85/71	27.7	23.4	33.1	1.94	14.3						
110	4.0	1.0	75/63	21.8	20.7	27.6	2.26	9.6						
			80/67	23.4	21.6	29.4	2.29	10.2						
			85/71	25.0	22.4	31.3	2.32	10.7						
	7.0	2.9	75/63	22.4	20.9	28.0	2.17	10.3						
			80/67	24.0	21.8	29.8	2.18	11.0						
			85/71	25.7	22.7	31.7	2.21	11.6						
	12.0	7.5	75/63	22.8	21.1	28.2	2.10	10.8						
			80/67	24.4	22.0	30.0	2.13	11.4						
			85/71	26.1	22.8	32.0	2.16	12.1						

See Legend on page 11.

50PSH,PSV036 — 1,200 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	7.0	4.6	75/63	38.6	29.6	43.9	1.60	24.1	30	60	27.4	20.4	2.06	3.9
			80/67	41.2	30.4	46.5	1.61	25.5		70	26.9	19.3	2.26	3.5
			85/71	44.0	31.3	49.4	1.62	27.1		80	26.4	18.2	2.48	3.1
	10.0	8.6	75/63	39.2	29.9	44.2	1.53	25.6		60	28.2	21.3	2.07	4.0
			80/67	41.9	30.7	47.0	1.54	27.2		70	27.6	20.1	2.27	3.6
			85/71	44.8	31.6	49.9	1.54	29.0		80	27.1	18.9	2.49	3.2
	13.0	13.9	75/63	39.5	30.0	44.5	1.50	26.4		60	28.9	21.7	2.08	4.1
			80/67	42.3	30.9	47.2	1.50	28.2		70	28.1	20.5	2.28	3.6
			85/71	45.1	31.8	50.1	1.50	30.1		80	27.6	19.3	2.50	3.2
	7.0	4.4	75/63	36.9	28.9	42.7	1.78	20.7		60	31.3	24.0	2.11	4.4
			80/67	39.5	29.8	45.4	1.80	22.0		70	30.7	22.8	2.31	3.9
			85/71	42.2	30.6	48.1	1.81	23.4		80	30.0	21.6	2.53	3.5
60	7.0	4.4	75/63	37.6	29.1	43.2	1.72	21.8	40	60	32.1	25.1	2.12	4.4
			80/67	40.1	30.1	45.8	1.73	23.2		70	31.5	23.8	2.32	4.0
			85/71	42.9	30.9	48.6	1.73	24.8		80	30.9	22.4	2.55	3.6
	10.0	8.4	75/63	37.8	29.2	43.4	1.69	22.4		60	32.8	25.7	2.13	4.5
			80/67	40.5	30.2	46.0	1.69	23.9		70	32.1	24.3	2.33	4.0
			85/71	43.2	31.1	48.8	1.69	25.5		80	31.5	22.9	2.56	3.6
	13.0	13.4	75/63	35.2	28.2	41.6	1.97	17.9		60	35.2	28.2	2.16	4.8
			80/67	37.6	29.2	44.1	1.98	18.9		70	34.5	26.9	2.37	4.3
			85/71	40.2	30.1	46.7	1.99	20.2		80	33.9	25.5	2.60	3.8
	7.0	8.1	75/63	35.8	28.4	42.0	1.91	18.7		60	36.8	29.2	2.18	5.0
			80/67	38.3	29.3	44.6	1.92	19.9		70	35.8	27.7	2.39	4.4
			85/71	41.0	30.2	47.3	1.92	21.3		80	35.1	26.2	2.62	3.9
70	7.0	4.3	75/63	36.1	28.5	42.2	1.88	19.2	50	60	37.3	30.0	2.19	5.0
			80/67	38.6	29.5	44.8	1.89	20.5		70	36.5	28.4	2.40	4.5
			85/71	41.3	30.3	47.5	1.89	21.9		80	35.8	26.9	2.63	4.0
	10.0	8.1	75/63	33.5	27.5	40.5	2.17	15.4		60	40.1	32.8	2.23	5.3
			80/67	35.9	28.5	43.0	2.19	16.4		70	39.0	30.6	2.44	4.7
			85/71	38.3	29.4	45.4	2.19	17.4		80	38.1	29.4	2.67	4.2
	13.0	13.0	75/63	34.0	27.7	40.8	2.11	16.1		60	41.5	33.7	2.25	5.4
			80/67	36.4	28.7	43.2	2.12	17.2		70	40.7	32.0	2.46	4.9
			85/71	38.8	29.6	45.8	2.12	18.3		80	40.0	30.4	2.69	4.4
	7.0	4.1	75/63	34.2	27.8	40.9	2.08	16.4		60	42.4	34.6	2.26	5.5
			80/67	36.6	28.8	43.4	2.09	17.5		70	41.2	33.1	2.47	4.9
			85/71	39.2	29.7	46.0	2.09	18.8		80	40.4	31.2	2.70	4.4
80	7.0	4.1	75/63	32.7	27.1	40.0	2.28	14.3	60	60	44.6	36.7	2.30	5.7
			80/67	34.9	28.1	42.3	2.29	15.2		70	43.5	35.2	2.51	5.1
			85/71	37.4	29.0	44.8	2.30	16.2		80	43.1	33.4	2.74	4.6
	10.0	7.7	75/63	33.1	27.3	40.3	2.22	14.9		60	46.3	38.7	2.33	5.8
			80/67	35.4	28.3	42.6	2.23	15.9		70	45.6	36.7	2.54	5.3
			85/71	38.0	29.3	45.2	2.23	17.0		80	44.2	35.4	2.77	4.7
	13.0	12.3	75/63	33.4	27.4	40.4	2.19	15.2		60	47.7	39.5	2.34	6.0
			80/67	35.7	28.4	42.8	2.20	16.2		70	46.6	37.6	2.55	5.4
			85/71	38.3	29.4	45.4	2.20	17.4		80	45.7	35.8	2.79	4.8
	7.0	4.0	75/63	31.8	26.7	39.4	2.39	13.3	80	60	49.6	41.4	2.38	6.1
			80/67	34.0	27.8	41.7	2.41	14.1		70	48.4	39.7	2.59	5.5
			85/71	36.3	28.7	44.1	2.42	15.0		80	48.2	37.4	2.82	5.0
90	7.0	4.0	75/63	32.1	26.9	39.6	2.33	13.8		60	51.4	44.0	2.41	6.2
			80/67	34.5	28.0	42.0	2.34	14.7		70	51.0	42.2	2.63	5.7
			85/71	37.0	28.9	44.6	2.35	15.8		80	49.7	39.5	2.86	5.1
	10.0	7.6	75/63	32.4	27.0	39.7	2.30	14.1		60	53.1	44.6	2.43	6.4
			80/67	34.8	28.1	42.2	2.31	15.1		70	51.9	42.6	2.65	5.7
			85/71	37.3	29.0	44.8	2.31	16.1		80	50.8	40.5	2.89	5.2
	13.0	12.2	75/63	29.9	26.0	38.3	2.64	11.3	100	60	55.8	48.8	2.44	6.7
			80/67	32.0	27.0	40.5	2.65	12.1		70	54.6	46.6	2.66	6.1
			85/71	34.3	28.0	42.8	2.66	12.9		80	53.4	44.4	2.89	5.5
	7.0	3.9	75/63	30.3	26.2	38.5	2.58	11.7		60	58.8	51.8	2.45	6.9
			80/67	32.5	27.2	40.8	2.58	12.6		70	57.6	49.6	2.68	6.3
			85/71	34.6	28.1	43.0	2.59	13.4		80	56.4	47.4	2.91	5.7
100	7.0	7.4	75/63	30.5	26.1	38.7	2.56	11.9		60	61.8	54.8	2.46	7.1
			80/67	32.8	27.2	41.0	2.56	12.8		70	60.6	52.6	2.69	6.5
			85/71	34.9	28.2	43.1	2.55	13.7		80	59.4	50.4	2.92	5.9
	10.0	11.8	75/63	28.1	24.5	37.4	2.92	9.6		60	66.8	60.8	2.47	7.3
			80/67	30.1	26.3	39.4	2.92	10.3		70	65.6	58.6	2.70	6.7
			85/71	32.2	27.3	41.6	2.93	11.0		80	64.4	56.4	2.93	6.1
	13.0	11.5	75/63	28.4	25.3	37.6	2.86	9.9	110	60	71.8	65.8	2.48	7.5
			80/67	30.6	26.5	39.7	2.86	10.7		70	70.6	63.6	2.71	6.9
			85/71	32.8	27.3	42.0	2.86	11.4		80	69.4	61.4	2.94	6.3
	7.0	3.8	75/63	25.5	25.5	37.6	2.82	10.1		60	76.8	70.8	2.49	7.7
			80/67	30.7	26.5	39.8	2.83	10.8		70	75.6	68.6	2.72	7.1
			85/71	33.0	27.5	42.1	2.83	11.6		80	74.4	66.4	2.95	6.5
110	7.0	3.8	75/63	28.1	24.5	37.4	2.92	9.6		60	81.8	75.8	2.50	7.9
			80/67	30.1	26.3	39.4	2.92	10.3		70	80.6	73.6	2.73	7.3
			85/71	32.2	27.3	41.6	2.93	11.0		80	79.4	71.4	2.96	6.7
	10.0	7.1	75/63	28.4	25.3	37.6	2.86	9.9		60	88.8	82.8	2.51	8.1
			80/67	30.6	26.5	39.7	2.86	10.7		70	87.6	80.6	2.74	7.5
			85/71	32.8	27.3	42.0	2.86	11.4		80	86.4	78.4	2.97	6.9
	13.0	11.5	75/63	28.6	25.5	37.6	2.82	10.1		60	95.8	89.8	2.52	8.3
			80/67	30.7	26.5	39.8	2.83	10.8		70	94.6	87.6	2.75	7.7
			85/71	33.0	27.5	42.1	2.83	11.6		80	93.4	85.4	2.98	7.1

Operation Not Recommended

See Legend on page 11.

Performance data (cont)



50PSH,PSV042 — 1,400 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	7.0	2.7	75/63	45.2	35.1	50.5	1.64	27.6	30	60	27.7	20.8	1.97	4.1
			80/67	48.3	36.1	53.8	1.65	29.4		70	27.1	19.4	2.20	3.6
			85/71	51.4	37.1	57.1	1.65	31.1		80	26.5	17.9	2.45	3.2
	10.5	5.7	75/63	46.1	35.4	51.3	1.55	29.8		60	28.9	21.7	1.98	4.3
			80/67	49.1	36.5	54.5	1.55	31.6		70	28.0	20.3	2.21	3.7
			85/71	52.3	37.3	57.9	1.56	33.6		80	27.4	18.8	2.46	3.3
	14.0	9.5	75/63	46.7	35.7	51.8	1.48	31.6		60	29.2	22.3	1.98	4.3
			80/67	49.8	36.7	55.0	1.47	33.8		70	28.4	20.8	2.21	3.8
			85/71	53.0	37.8	58.3	1.47	36.0		80	27.8	19.2	2.46	3.3
60	7.0	2.6	75/63	43.2	34.3	49.0	1.85	23.4	40	60	31.9	24.8	2.01	4.7
			80/67	46.2	35.3	52.2	1.86	24.8		70	31.0	23.1	2.24	4.1
			85/71	49.2	36.3	55.4	1.87	26.3		80	30.3	21.5	2.49	3.6
	10.5	5.5	75/63	44.1	34.7	49.7	1.76	25.1		60	32.8	26.0	2.02	4.8
			80/67	47.1	35.7	52.9	1.77	26.7		70	32.3	24.2	2.26	4.2
			85/71	50.1	36.7	56.1	1.77	28.2		80	31.4	22.7	2.51	3.7
	14.0	9.2	75/63	44.7	34.8	50.2	1.69	26.4		60	33.5	26.6	2.03	4.8
			80/67	47.7	36.0	53.3	1.69	28.1		70	33.0	24.8	2.26	4.3
			85/71	50.8	37.0	56.6	1.70	29.9		80	31.9	23.2	2.52	3.7
70	7.0	2.6	75/63	41.3	33.2	47.5	2.08	19.8	50	60	36.2	29.0	2.06	5.1
			80/67	44.0	34.6	50.4	2.08	21.1		70	35.5	27.5	2.30	4.5
			85/71	47.0	35.6	53.5	2.09	22.4		80	34.5	25.4	2.55	4.0
	10.5	5.3	75/63	42.2	33.7	48.2	1.97	21.4		60	37.5	30.4	2.08	5.3
			80/67	45.0	35.0	51.2	1.98	22.7		70	36.5	28.8	2.32	4.6
			85/71	48.0	35.9	54.4	1.99	24.1		80	36.1	26.8	2.57	4.1
	14.0	8.9	75/63	42.7	34.0	48.6	1.91	22.3		60	38.8	30.8	2.09	5.4
			80/67	45.6	35.2	51.7	1.91	23.8		70	37.4	29.5	2.33	4.7
			85/71	48.7	36.2	54.9	1.92	25.3		80	36.8	27.5	2.59	4.2
80	7.0	2.5	75/63	39.2	32.5	45.9	2.31	17.0	60	60	41.0	33.6	2.13	5.7
			80/67	42.0	33.5	48.9	2.33	18.0		70	40.3	31.5	2.37	5.0
			85/71	44.8	34.6	51.9	2.34	19.1		80	39.5	29.5	2.63	4.4
	10.5	5.1	75/63	40.2	32.9	46.7	2.19	18.3		60	42.6	35.7	2.15	5.8
			80/67	42.9	34.2	49.6	2.21	19.4		70	41.5	33.8	2.39	5.1
			85/71	45.8	35.2	52.6	2.22	20.6		80	40.4	31.5	2.65	4.5
	14.0	8.6	75/63	40.6	33.2	47.0	2.13	19.0		60	43.8	35.7	2.17	5.9
			80/67	43.5	34.4	50.0	2.14	20.3		70	42.4	33.9	2.41	5.2
			85/71	46.5	35.3	53.2	2.15	21.6		80	41.7	32.1	2.67	4.6
85	7.0	2.4	75/63	38.2	32.2	45.1	2.43	15.7	70	60	45.7	38.2	2.21	6.1
			80/67	40.8	33.3	47.9	2.45	16.6		70	44.6	36.3	2.45	5.3
			85/71	43.6	34.4	51.0	2.47	17.7		80	43.5	34.2	2.72	4.7
	10.5	5.1	75/63	39.2	32.5	45.9	2.31	16.9		60	47.9	40.6	2.24	6.3
			80/67	41.9	33.7	48.7	2.32	18.0		70	46.7	38.7	2.49	5.5
			85/71	44.8	34.7	51.9	2.34	19.1		80	45.6	36.7	2.76	4.9
	14.0	8.5	75/63	39.7	32.7	46.3	2.25	17.6		60	49.0	41.2	2.26	6.4
			80/67	42.5	33.9	49.3	2.26	18.8		70	48.2	38.7	2.51	5.6
			85/71	45.3	35.0	52.3	2.27	19.9		80	46.6	37.1	2.77	4.9
90	7.0	2.4	75/63	37.3	31.7	44.5	2.55	14.6	80	60	50.9	43.5	2.30	6.5
			80/67	39.8	32.9	47.3	2.58	15.4		70	49.8	41.4	2.55	5.7
			85/71	42.5	33.9	50.2	2.61	16.3		80	48.7	39.6	2.82	5.1
	10.5	5.0	75/63	38.1	32.2	45.1	2.44	15.6		60	53.6	45.7	2.35	6.7
			80/67	40.8	33.4	48.0	2.45	16.7		70	52.5	43.4	2.60	5.9
			85/71	43.7	34.3	51.0	2.47	17.7		80	51.1	41.3	2.87	5.2
	14.0	8.4	75/63	38.6	32.4	45.5	2.38	16.2		60	54.8	47.8	2.38	6.8
			80/67	41.3	33.6	48.4	2.38	17.3		70	54.0	44.2	2.62	6.0
			85/71	44.2	34.6	51.4	2.40	18.4		80	51.9	42.1	2.89	5.3
100	7.0	2.3	75/63	35.4	31.0	43.2	2.82	12.6	Operation Not Recommended					
			80/67	37.9	32.1	45.9	2.85	13.3						
			85/71	40.4	33.2	48.7	2.88	14.0						
	10.5	4.8	75/63	36.2	31.4	43.7	2.70	13.4						
			80/67	38.8	32.5	46.5	2.72	14.3						
			85/71	41.4	33.6	49.4	2.74	15.1						
	14.0	8.1	75/63	36.7	31.5	44.1	2.64	13.9						
			80/67	39.2	32.7	46.8	2.65	14.8						
			85/71	41.9	33.9	49.7	2.66	15.7						
110	7.0	2.3	75/63	33.5	30.2	42.0	3.12	10.7						
			80/67	35.9	31.4	44.6	3.15	11.4						
			85/71	38.2	32.6	47.2	3.18	12.0						
	10.5	4.7	75/63	34.2	30.6	42.5	2.99	11.4						
			80/67	36.8	31.7	45.2	3.01	12.2						
			85/71	39.2	32.9	47.8	3.03	12.9						
	14.0	7.9	75/63	34.6	30.7	42.7	2.93	11.8						
			80/67	37.1	32.0	45.4	2.94	12.6						
			85/71	39.8	33.0	48.3	2.96	13.4						

See Legend on page 11.

50PSH,PSV048 — 1,600 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	8.0	6.0	75/63	52.3	40.0	59.3	2.13	24.6	30	60	33.1	24.6	2.52	3.8
			80/67	55.9	41.3	62.8	2.10	26.6		70	32.5	23.2	2.77	3.4
			85/71	59.5	42.5	66.3	2.07	28.8		80	32.2	22.0	3.07	3.1
	12.0	12.4	75/63	53.4	40.5	60.0	2.03	26.3		60	34.3	25.8	2.54	4.0
			80/67	57.0	41.8	63.5	1.99	28.7		70	33.6	24.3	2.79	3.5
			85/71	60.8	43.0	67.3	1.94	31.3		80	33.1	22.8	3.09	3.1
	15.0	18.5	75/63	53.8	40.7	60.3	1.99	27.0		60	35.2	26.1	2.55	4.0
			80/67	57.4	42.0	63.9	1.95	29.5		70	34.1	24.7	2.80	3.6
			85/71	61.4	43.0	67.8	1.90	32.3		80	33.6	23.2	3.10	3.2
60	8.0	5.8	75/63	50.1	39.1	57.8	2.35	21.3	40	60	38.0	28.8	2.59	4.3
			80/67	53.5	40.5	61.1	2.33	22.9		70	37.4	27.3	2.85	3.8
			85/71	57.1	41.6	64.6	2.31	24.7		80	36.5	25.8	3.16	3.4
	12.0	12.0	75/63	51.0	39.6	58.4	2.25	22.7		60	39.1	30.4	2.61	4.4
			80/67	54.6	40.9	61.9	2.22	24.6		70	38.4	28.7	2.88	3.9
			85/71	58.4	41.9	65.6	2.18	26.8		80	37.8	27.1	3.18	3.5
	15.0	17.9	75/63	51.4	39.8	58.6	2.21	23.3		60	40.2	30.8	2.62	4.5
			80/67	55.1	40.9	62.3	2.18	25.3		70	39.4	29.1	2.89	4.0
			85/71	58.9	42.1	65.9	2.13	27.6		80	38.3	27.6	3.20	3.5
70	8.0	5.6	75/63	47.9	38.2	56.3	2.62	18.3	50	60	42.6	33.9	2.66	4.7
			80/67	51.1	39.5	59.5	2.60	19.6		70	42.0	32.0	2.94	4.2
			85/71	54.6	40.6	63.1	2.58	21.1		80	41.3	30.6	3.26	3.7
	12.0	11.6	75/63	48.7	38.6	56.8	2.51	19.4		60	44.9	35.3	2.68	4.9
			80/67	52.2	39.9	60.2	2.48	21.0		70	43.6	33.9	2.96	4.3
			85/71	55.8	41.1	63.7	2.45	22.8		80	43.0	32.0	3.29	3.8
	15.0	17.3	75/63	49.2	38.6	57.1	2.47	19.9		60	45.3	36.3	2.69	4.9
			80/67	52.7	39.9	60.6	2.44	21.6		70	44.4	34.3	2.98	4.4
			85/71	56.2	41.3	64.0	2.40	23.4		80	43.7	32.8	3.30	3.9
80	8.0	5.4	75/63	45.5	37.3	54.9	2.92	15.6	60	60	48.3	39.1	2.73	5.2
			80/67	48.8	38.5	58.2	2.91	16.8		70	47.2	36.9	3.03	4.6
			85/71	52.0	39.8	61.3	2.89	18.0		80	46.4	35.4	3.36	4.0
	12.0	11.2	75/63	46.4	37.5	55.5	2.81	16.5		60	50.6	40.7	2.75	5.4
			80/67	49.7	38.9	58.7	2.78	17.8		70	49.7	38.7	3.05	4.8
			85/71	53.1	40.2	62.0	2.75	19.3		80	49.0	36.6	3.39	4.2
	15.0	16.7	75/63	46.7	37.5	55.6	2.77	16.8		60	51.5	41.6	2.76	5.5
			80/67	50.1	38.9	59.0	2.75	18.2		70	50.6	39.5	3.07	4.8
			85/71	53.6	40.1	62.4	2.71	19.8		80	49.2	37.5	3.40	4.2
85	8.0	5.3	75/63	44.3	36.8	54.2	3.08	14.4	70	60	54.1	44.0	2.78	5.7
			80/67	47.5	38.0	57.4	3.07	15.4		70	53.2	42.0	3.10	5.0
			85/71	50.7	39.3	60.5	3.06	16.6		80	52.4	40.0	3.43	4.5
	12.0	11.0	75/63	45.1	37.1	54.6	2.97	15.2		60	56.5	46.5	2.80	5.9
			80/67	48.4	38.5	57.9	2.95	16.4		70	55.6	44.2	3.12	5.2
			85/71	51.7	39.7	61.2	2.92	17.7		80	53.9	42.8	3.46	4.6
	15.0	16.5	75/63	45.4	37.2	54.8	2.93	15.5		60	57.6	47.5	2.81	6.0
			80/67	48.7	38.6	58.0	2.90	16.8		70	56.6	45.2	3.12	5.3
			85/71	52.2	39.9	61.5	2.87	18.2		80	55.6	42.9	3.46	4.7
90	8.0	5.2	75/63	43.2	36.2	53.7	3.26	13.3	80	60	60.5	49.3	2.82	6.3
			80/67	46.3	37.5	56.7	3.25	14.2		70	58.3	47.5	3.14	5.4
			85/71	49.3	38.9	59.8	3.23	15.2		80	57.9	45.3	3.48	4.9
	12.0	10.8	75/63	43.9	36.6	54.0	3.14	14.0		60	62.4	52.4	2.82	6.5
			80/67	47.1	38.0	57.1	3.12	15.1		70	60.9	50.8	3.15	5.7
			85/71	50.3	39.2	60.4	3.10	16.2		80	60.4	47.7	3.49	5.1
	15.0	16.2	75/63	44.2	36.7	54.1	3.10	14.2		60	64.0	53.8	2.82	6.6
			80/67	47.4	37.9	57.4	3.09	15.3		70	62.7	51.2	3.15	5.8
			85/71	50.7	39.4	60.6	3.05	16.6		80	61.5	48.7	3.50	5.1
100	8.0	5.1	75/63	40.8	35.2	52.4	3.63	11.2	Operation Not Recommended					
			80/67	43.6	36.7	55.3	3.62	12.0						
			85/71	46.7	37.8	58.4	3.61	12.9						
	12.0	10.5	75/63	41.4	35.6	52.6	3.52	11.8						
			80/67	44.4	37.0	55.6	3.50	12.7						
			85/71	47.5	38.3	58.7	3.48	13.6						
	15.0	15.7	75/63	41.9	35.6	52.9	3.47	12.1						
			80/67	44.8	37.0	55.9	3.45	13.0						
			85/71	47.9	38.4	58.9	3.44	13.9						
110	8.0	4.9	75/63	38.3	34.3	51.2	4.04	9.5						
			80/67	41.1	35.6	54.1	4.04	10.2						
			85/71	44.0	36.8	56.9	4.03	10.9						
	12.0	10.2	75/63	38.9	34.6	51.5	3.94	9.9						
			80/67	41.8	35.8	54.4	3.94	10.6						
			85/71	44.7	37.2	57.3	3.91	11.4						
	15.0	15.3	75/63	39.4	34.6	51.7	3.87	10.2						
			80/67	42.2	36.1	54.5	3.86	10.9						
			85/71	45.0	37.4	57.4	3.85	11.7						

See Legend on page 11.

Performance data (cont)



50PSH,PSV060 — 2,000 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	9.0	3.9	75/63	66.9	50.7	76.8	2.98	22.5	30	60	47.0	34.9	3.37	4.1
			80/67	71.5	52.3	81.5	3.00	23.8		70	46.4	33.1	3.70	3.7
			85/71	76.2	53.6	86.3	3.03	25.2		80	45.4	31.6	4.07	3.3
	15.0	9.9	75/63	68.8	51.5	78.2	2.82	24.4		60	48.9	37.5	3.41	4.2
			80/67	73.8	53.0	83.3	2.84	26.0		70	48.1	35.5	3.74	3.8
			85/71	78.6	54.5	88.2	2.85	27.6		80	47.4	33.5	4.11	3.4
	20.0	16.6	75/63	69.5	51.9	78.8	2.76	25.2		60	49.9	38.1	3.42	4.3
			80/67	74.6	53.3	83.9	2.78	26.9		70	49.0	36.3	3.76	3.8
			85/71	79.7	54.7	89.1	2.79	28.6		80	48.2	34.2	4.12	3.4
	9.0	3.8	75/63	64.4	49.6	75.1	3.23	19.9		60	53.0	41.3	3.47	4.5
			80/67	68.8	51.1	79.6	3.26	21.1		70	52.2	39.5	3.81	4.0
			85/71	73.5	52.4	84.4	3.28	22.4		80	53.0	36.3	4.19	3.7
60	15.0	9.6	75/63	66.2	50.4	76.4	3.07	21.6	40	60	56.0	44.1	3.52	4.7
			80/67	70.7	51.7	80.9	3.08	23.0		70	54.9	41.9	3.86	4.2
			85/71	75.4	53.3	85.7	3.09	24.4		80	54.0	39.7	4.23	3.7
	20.0	16.0	75/63	66.6	50.6	76.5	3.01	22.2		60	57.2	45.1	3.54	4.7
			80/67	71.3	52.2	81.4	3.01	23.7		70	56.0	42.7	3.88	4.2
			85/71	76.3	53.7	86.4	3.02	25.3		80	55.0	40.7	4.25	3.8
	9.0	3.7	75/63	61.4	48.4	73.0	3.53	17.4		60	60.1	48.1	3.59	4.9
			80/67	65.7	50.0	77.4	3.55	18.5		70	60.5	44.9	3.93	4.5
			85/71	68.3	48.8	80.1	3.56	19.2		80	59.7	42.8	4.31	4.1
	15.0	9.2	75/63	63.1	49.1	74.2	3.35	18.9		60	63.7	51.5	3.65	5.1
			80/67	67.6	50.7	78.7	3.36	20.2		70	62.4	49.0	3.98	4.6
			85/71	72.1	52.1	83.3	3.36	21.4		80	61.3	46.3	4.36	4.1
70	20.0	15.5	75/63	63.9	49.2	74.8	3.29	19.4		60	65.2	52.9	3.67	5.2
			80/67	68.5	51.0	79.4	3.29	20.8		70	63.8	50.4	4.01	4.7
			85/71	72.9	52.4	83.8	3.29	22.1		80	62.5	47.8	4.39	4.2
	9.0	3.6	75/63	58.3	47.0	70.9	3.86	15.1	60	60	67.7	55.6	3.71	5.4
			80/67	62.4	48.7	75.2	3.88	16.1		70	66.6	52.6	4.05	4.8
			85/71	66.6	50.2	79.4	3.90	17.1		80	66.1	49.8	4.44	4.4
	15.0	8.9	75/63	60.0	47.8	72.1	3.68	16.3		60	71.9	59.4	3.77	5.6
			80/67	64.1	49.3	76.2	3.68	17.4		70	70.4	56.6	4.12	5.0
			85/71	68.8	51.0	81.0	3.68	18.7		80	69.1	54.3	4.51	4.5
	20.0	15.0	75/63	58.9	45.0	70.9	3.63	16.2		60	73.8	61.1	3.80	5.7
			80/67	64.7	49.6	76.6	3.61	17.9		70	72.1	58.2	4.14	5.1
			85/71	69.6	51.2	81.5	3.61	19.3		80	70.6	55.3	4.53	4.6
	9.0	3.5	75/63	56.8	46.4	70.1	4.05	14.0	70	60	76.2	62.3	3.82	5.8
			80/67	59.2	45.0	72.5	4.06	14.6		70	75.6	59.2	4.18	5.3
			85/71	63.2	46.6	76.6	4.08	15.5		80	74.4	56.5	4.58	4.8
85	15.0	8.8	75/63	56.8	44.1	69.5	3.86	14.7		60	80.7	67.7	3.90	6.1
			80/67	60.9	45.8	73.6	3.86	15.8		70	78.9	64.6	4.26	5.4
			85/71	67.0	50.3	79.7	3.86	17.3		80	77.9	60.5	4.66	4.9
	20.0	14.8	75/63	59.0	47.3	71.4	3.80	15.5		60	82.8	69.7	3.93	6.2
			80/67	63.2	49.0	75.7	3.79	16.7		70	80.8	66.5	4.29	5.5
			85/71	67.7	50.6	80.2	3.79	17.9		80	79.0	63.2	4.69	4.9
	9.0	3.5	75/63	53.9	45.2	67.7	4.24	12.7	80	60	84.4	70.2	3.95	6.3
			80/67	59.4	47.5	73.4	4.27	13.9		70	82.9	67.2	4.31	5.6
			85/71	61.5	45.8	75.6	4.28	14.4		80	81.4	64.1	4.72	5.0
90	15.0	8.7	75/63	55.5	45.9	68.7	4.04	13.7		60	90.2	75.4	4.04	6.5
			80/67	60.9	48.1	74.2	4.06	15.0		70	88.3	71.9	4.41	5.9
			85/71	65.1	49.7	78.5	4.06	16.0		80	86.4	68.4	4.82	5.3
	20.0	14.5	75/63	56.0	46.1	69.0	3.97	14.1		60	92.1	78.6	4.08	6.6
			80/67	61.4	48.3	74.5	3.99	15.4		70	89.8	75.1	4.45	5.9
			85/71	65.8	49.9	79.0	3.98	16.5		80	87.7	71.4	4.86	5.3
100	9.0	3.4	75/63	49.6	43.5	64.8	4.67	10.6	Operation Not Recommended					
			80/67	51.8	44.7	67.0	4.67	11.1						
			85/71	57.8	44.6	73.2	4.71	12.3						
	15.0	8.4	75/63	49.9	43.6	64.3	4.45	11.2						
			80/67	54.2	45.6	68.8	4.46	12.1						
			85/71	61.5	48.4	76.3	4.49	13.7						
	20.0	14.1	75/63	51.2	44.2	65.5	4.40	11.6						
			80/67	56.3	43.4	70.8	4.44	12.7						
			85/71	60.1	45.9	74.5	4.41	13.6						
110	9.0	3.3	75/63	47.2	39.7	64.0	5.18	9.1						
			80/67	52.2	36.0	69.3	5.23	10.0						
			85/71	56.2	35.9	73.4	5.25	10.7						
	15.0	8.2	75/63	48.5	39.8	64.8	5.02	9.7						
			80/67	51.9	42.4	68.2	4.99	10.4						
			85/71	57.6	36.5	74.2	5.04	11.4						
	20.0	13.7	75/63	50.3	36.3	66.3	4.91	10.3						
			80/67	52.5	42.1	68.6	4.92	10.7						
			85/71	56.3	43.7	72.4	4.92	11.4						

See Legend on page 11.

50PSH,PSV070 — 2,200 CFM NOMINAL AIRFLOW

COOLING									HEATING					
EWT (F)	Water Flow (gpm)	Pressure Drop psi (FOH)	Entering Air Temp (db/wb) (F)	Total Capacity (MBtuh)	Sensible Capacity (MBtuh)	Heat of Rejection (MBtuh)	Power Input (kW)	EER	EWT (F)	Entering Air Temp (F)	Total Capacity (MBtuh)	Heat of Absorption (MBtuh)	Power Input (kW)	COP
50	10.0	3.0	75/63	71.4	52.2	82.8	3.43	20.8	30	60	53.4	39.8	3.98	3.9
			80/67	78.4	57.1	90.1	3.51	22.4		70	52.4	37.6	4.37	3.5
			85/71	83.2	58.5	95.1	3.56	23.4		80	52.5	35.4	4.81	3.2
	17.0	7.9	75/63	75.4	56.3	86.3	3.25	23.2		60	56.3	42.6	4.02	4.1
			80/67	78.4	54.8	89.4	3.29	23.9		70	55.3	40.2	4.41	3.7
			85/71	85.9	59.5	97.0	3.32	25.9		80	54.5	37.6	4.85	3.3
	22.0	12.6	75/63	73.8	53.6	84.5	3.18	23.2		60	57.4	43.6	4.04	4.2
			80/67	79.1	55.3	89.8	3.21	24.6		70	56.3	41.1	4.42	3.7
			85/71	86.6	59.8	97.4	3.21	27.0		80	55.4	38.5	4.87	3.3
60	10.0	2.9	75/63	70.3	54.1	82.8	3.77	18.6	40	60	60.6	46.7	4.08	4.4
			80/67	75.1	55.9	87.9	3.83	19.6		70	59.5	44.3	4.48	3.9
			85/71	80.0	57.4	93.0	3.88	20.6		80	58.8	42.1	4.92	3.5
	17.0	7.6	75/63	72.2	55.0	84.1	3.58	20.2		60	64.3	50.2	4.15	4.5
			80/67	77.2	56.7	89.2	3.62	21.3		70	63.4	47.6	4.53	4.1
			85/71	82.7	58.0	95.0	3.66	22.6		80	62.3	45.0	4.98	3.7
	22.0	12.2	75/63	72.9	55.3	84.6	3.51	20.8		60	65.9	51.5	4.17	4.6
			80/67	77.8	56.9	89.7	3.57	21.8		70	64.7	48.8	4.55	4.2
			85/71	83.3	58.3	95.4	3.61	23.1		80	63.6	46.1	5.00	3.7
70	10.0	2.8	75/63	67.2	52.6	80.8	4.13	16.3	50	60	67.8	54.2	4.21	4.7
			80/67	71.6	54.5	85.5	4.18	17.1		70	67.8	51.7	4.61	4.3
			85/71	76.4	56.1	90.5	4.24	18.0		80	66.3	49.3	5.06	3.8
	17.0	7.4	75/63	68.8	53.3	81.9	3.95	17.4		60	73.4	58.6	4.29	5.0
			80/67	73.6	55.2	86.8	3.99	18.5		70	71.7	56.2	4.69	4.5
			85/71	78.4	56.8	91.7	3.98	19.7		80	70.4	53.6	5.14	4.0
	22.0	11.8	75/63	69.8	53.8	82.5	3.85	18.2		60	75.2	60.2	4.32	5.1
			80/67	74.3	55.5	87.3	3.90	19.0		70	73.7	57.3	4.71	4.6
			85/71	79.4	57.1	92.6	3.94	20.1		80	72.2	54.0	5.17	4.1
80	10.0	2.8	75/63	63.7	51.3	78.6	4.53	14.1	60	60	76.6	62.6	4.36	5.2
			80/67	68.0	53.1	83.1	4.58	14.9		70	76.0	59.5	4.76	4.7
			85/71	72.7	54.7	88.0	4.63	15.7		80	74.9	56.8	5.22	4.2
	17.0	7.2	75/63	65.4	52.0	79.6	4.32	15.1		60	83.0	67.6	4.46	5.5
			80/67	69.8	53.8	84.3	4.39	15.9		70	81.1	65.0	4.87	4.9
			85/71	74.8	55.4	89.4	4.42	16.9		80	79.6	62.2	5.33	4.4
	22.0	11.4	75/63	66.3	52.4	80.2	4.21	15.7		60	85.1	69.6	4.50	5.5
			80/67	70.8	54.2	84.9	4.27	16.6		70	83.4	66.3	4.91	5.0
			85/71	75.4	55.5	89.8	4.32	17.5		80	81.3	62.9	5.37	4.4
85	10.0	2.7	75/63	59.8	46.9	75.3	4.72	12.7	70	60	86.6	71.1	4.53	5.6
			80/67	66.5	52.5	82.3	4.80	13.9		70	85.3	68.1	4.95	5.1
			85/71	71.2	54.1	87.2	4.85	14.7		80	84.0	65.1	5.41	4.5
	17.0	7.0	75/63	63.9	51.4	78.8	4.53	14.1		60	93.1	77.1	4.66	5.9
			80/67	68.1	53.1	83.3	4.59	14.8		70	91.0	74.2	5.08	5.2
			85/71	73.0	54.4	88.3	4.65	15.7		80	89.0	70.1	5.55	4.7
	22.0	11.2	75/63	64.6	51.7	79.1	4.42	14.6		60	95.6	79.3	4.71	5.9
			80/67	69.3	53.5	84.1	4.48	15.5		70	93.6	75.8	5.13	5.3
			85/71	71.2	51.7	86.1	4.50	15.8		80	91.7	72.1	5.60	4.8
90	10.0	2.7	75/63	58.4	45.0	74.7	4.98	11.7	80	60	96.2	80.0	4.73	6.0
			80/67	62.5	47.3	79.0	5.01	12.5		70	94.6	76.8	5.16	5.4
			85/71	68.5	40.1	85.7	5.22	13.1		80	93.1	73.4	5.63	4.8
	17.0	6.9	75/63	62.2	50.7	77.8	4.75	13.1		60	103.6	86.2	4.90	6.2
			80/67	66.4	52.4	82.2	4.80	13.8		70	101.5	83.1	5.33	5.6
			85/71	70.8	54.0	86.8	4.85	14.6		80	99.5	79.3	5.80	5.0
	22.0	11.0	75/63	63.0	51.0	78.2	4.63	13.6		60	106.4	89.4	4.97	6.3
			80/67	67.3	52.8	82.7	4.68	14.4		70	104.1	85.4	5.39	5.7
			85/71	71.9	54.4	87.5	4.72	15.2		80	101.9	81.4	5.87	5.1
100	10.0	2.6	75/63	55.0	42.7	73.1	5.53	9.9	Operation Not Recommended					
			80/67	58.2	47.3	76.1	5.47	10.6						
			85/71	64.8	38.7	83.5	5.68	11.4						
	17.0	6.7	75/63	56.5	45.1	73.4	5.18	10.9						
			80/67	60.6	47.0	77.8	5.23	11.6						
			85/71	63.6	51.6	80.9	5.26	12.1						
	22.0	10.7	75/63	57.5	45.3	74.1	5.08	11.3						
			80/67	61.6	47.3	78.3	5.11	12.1						
			85/71	68.2	53.1	85.3	5.17	13.2						
110	10.0	2.5	75/63	51.0	42.1	71.0	6.11	8.4						
			80/67	55.7	41.2	76.0	6.17	9.0						
			85/71	58.9	45.2	79.2	6.16	9.6						
	17.0	6.5	75/63	52.5	46.8	71.2	5.71	9.2						
			80/67	56.8	45.5	75.6	5.76	9.9						
			85/71	61.3	46.5	80.3	5.80	10.6						
	22.0	10.4	75/63	53.9	44.0	72.2	5.59	9.6						
			80/67	57.0	48.9	75.4	5.62	10.1						
			85/71	62.2	47.1	80.8	5.65	11.0						

See Legend on page 11.

Performance data (cont)



ANTIFREEZE CORRECTION TABLE

ANTIFREEZE TYPE	ANTIFREEZE %	COOLING			HEATING		WPD CORRECTION FACTOR
		EWT 90 F			EWT 30 F		
		Total Capacity	Sensible Capacity	kW	Heating Capacity	kW	EWT 30 F
Water	0	1.000	1.000	1.000	1.000	1.000	1.000
Propylene Glycol	5	0.997	0.997	1.004	0.989	0.997	1.060
	10	0.994	0.994	1.006	0.986	0.995	1.125
	15	0.990	0.990	1.009	0.978	0.988	1.190
	25	0.983	0.983	1.016	0.960	0.979	1.300
Methanol	5	0.997	0.997	1.003	0.990	0.997	1.060
	10	0.996	0.996	1.005	0.979	0.993	1.100
	15	0.994	0.994	1.008	0.970	0.990	1.140
Ethanol	5	0.998	0.998	1.002	0.981	0.994	1.160
	10	0.996	0.996	1.004	0.960	0.988	1.230
	15	0.992	0.992	1.006	0.944	0.983	1.280
	25	0.986	0.986	1.009	0.917	0.974	1.400
Ethylene Glycol	5	0.997	0.997	1.003	0.993	0.998	1.060
	10	0.995	0.995	1.004	0.986	0.996	1.120
	15	0.992	0.992	1.005	0.980	0.993	1.190
	25	0.988	0.988	1.009	0.970	0.990	1.330
	30	0.985	0.985	1.012	0.965	0.987	1.400

LEGEND

EWT — Entering Water Temperature
WPD — Water Pressure Differential

50PS BLOWER PERFORMANCE

STANDARD MOTOR - PSC FOR 007-012, CONSTANT TORQUE FOR 015-070

50PS	MOTOR SPEED	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
007	High	430	420	390	360	335	310	260	—	—	—	—	—
	Med	420	390	365	335	310	270	—	—	—	—	—	—
	Low	370	360	340	315	285	245	—	—	—	—	—	—
009	High	430	420	390	360	335	310	260	—	—	—	—	—
	Med	420	390	365	335	310	270	—	—	—	—	—	—
	Low	370	360	340	315	285	245	—	—	—	—	—	—
012	High	450	435	415	400	385	360	330	305	—	—	—	—
	Med	425	405	385	375	360	335	310	—	—	—	—	—
	Low	390	380	365	350	335	315	290	—	—	—	—	—
015	High	710	685	650	610	575	545	460	370	—	—	—	—
	Med	530	510	480	445	405	360	—	—	—	—	—	—
	Low	430	410	370	335	290	245	—	—	—	—	—	—
018	High	730	700	660	615	580	545	505	460	—	—	—	—
	Med	615	575	540	500	460	420	—	—	—	—	—	—
	Low	540	510	480	445	405	360	—	—	—	—	—	—
024	High	975	945	910	880	855	825	790	750	—	—	—	—
	Med	905	885	855	825	790	755	700	650	—	—	—	—
	Low	725	700	670	640	585	530	—	—	—	—	—	—
030	High	1,225	1,195	1,170	1,140	1,110	1,075	1,010	940	745	—	—	—
	Med	1,110	1,075	1,045	1,015	985	955	915	880	700	—	—	—
	Low	955	925	890	860	825	790	750	715	685	—	—	—
036	High	1,440	1,420	1,400	1,380	1,345	1,315	1,240	1,165	1,005	845	—	—
	Med	1,340	1,315	1,290	1,270	1,245	1,225	1,180	1,135	990	848	—	—
	Low	1,190	1,165	1,140	1,115	1,090	1,065	1,040	1,020	915	810	—	—
042	High	1,645	1,635	1,610	1,585	1,560	1,535	1,510	1,485	1,460	1,430	—	—
	Med	1,455	1,425	1,400	1,375	1,345	1,320	1,290	1,260	1,225	1,190	—	—
	Low	1,220	1,190	1,160	1,130	1,100	1,070	1,015	955	895	830	—	—
048	High	1,840	1,820	1,795	1,775	1,745	1,720	1,695	1,670	1,645	1,615	—	—
	Med	1,655	1,635	1,610	1,585	1,560	1,535	1,510	1,485	1,460	1,430	—	—
	Low	1,455	1,425	1,400	1,375	1,345	1,320	1,290	1,260	1,225	1,190	—	—
060	High	2,225	2,195	2,165	2,135	2,105	2,075	2,045	2,015	1,980	1,945	1,900	1,850
	Med	2,070	2,045	2,015	1,990	1,960	1,925	1,895	1,870	1,840	1,810	1,685	1,600
	Low	1,815	1,785	1,755	1,725	1,695	1,665	1,630	1,595	1,555	1,515	1,425	—
070	High	2,560	2,520	2,480	2,440	2,400	2,360	2,320	2,275	2,245	2,210	2,150	2,050
	Med	2,440	2,400	2,360	2,320	2,280	2,245	2,200	2,155	2,120	2,085	2,000	1,900
	Low	1,920	1,880	1,835	1,795	1,745	1,695	1,655	1,615	1,570	1,520	1,425	—

50PS BLOWER PERFORMANCE ECM MOTOR

50PS	MOTOR SPEED	AIRFLOW (cfm) AT EXTERNAL STATIC PRESSURE (in. wg)											
		0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90	1.00	1.10	1.20
015	+	575	575	575	575	575	575	575	575	—	—	—	—
	Normal	500	500	500	500	500	500	500	500	—	—	—	—
	-	425	425	425	425	425	425	425	425	—	—	—	—
018	+	745	745	745	745	745	745	745	745	—	—	—	—
	Normal	650	650	650	650	650	650	650	650	—	—	—	—
	-	555	555	555	555	555	555	555	555	—	—	—	—
024	+	1,095	1,095	1,095	1,095	1,095	1,095	1,095	1,095	1,095	—	—	—
	Normal	950	950	950	950	950	950	950	950	950	—	—	—
	-	810	810	810	810	810	810	810	810	810	—	—	—
030	+	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	—	—	—
	Normal	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	—	—	—
	-	850	850	850	850	850	850	850	850	850	—	—	—
036	+	1,380	1,380	1,380	1,380	1,380	1,380	1,380	1,380	1,380	1,380	—	—
	Normal	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	—	—
	-	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	1,020	—	—
042	+	1,610	1,610	1,610	1,610	1,610	1,610	1,610	1,610	1,610	1,610	—	—
	Normal	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	—	—
	-	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	1,190	—	—
048	+	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	—	—
	Normal	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	—	—
	-	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	—	—
060	+	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
	Normal	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000
	-	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	1,700	—
070	+	2,415	2,415	2,415	2,415	2,415	2,415	2,415	2,415	2,415	2,415	2,415	2,415
	Normal	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100	2,100
	-	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	1,785	—

Performance data (cont)



SOUND DATA — SOUND POWER LEVEL, CASING RADIATED

50PS UNIT	LOAD	OCTAVE BAND SOUND POWER LEVELS db, RE 10-12 WATTS								Overall (dBA)
		125	250	500	1000	2000	4000	8000	Overall	
007	Cooling Full	64	48	43	42	38	32	27	64	50
	Heating Full	63	58	44	44	40	34	28	64	53
	Fan Only	54	43	42	42	37	31	24	55	46
009	Cooling Full	61	50	46	51	45	40	34	62	54
	Heating Full	62	53	46	51	45	40	34	63	54
	Fan Only	55	48	47	51	45	40	32	58	53
012	Cooling Full	66	58	51	51	45	41	35	67	56
	Heating Full	71	61	51	51	45	40	34	71	59
	Fan Only	61	56	51	51	45	39	33	63	55
015	Cooling Full	59	51	51	46	42	34	32	60	52
	Heating Full	63	56	57	55	51	45	40	66	59
	Fan Only	51	46	46	38	33	25	23	45	45
018	Cooling Full	71	62	53	49	47	45	41	72	59
	Heating Full	76	66	59	56	55	52	47	77	65
	Fan Only	50	48	49	42	35	30	24	54	48
024	Cooling Full	63	55	54	49	42	37	28	65	55
	Heating Full	71	56	54	50	44	41	32	72	58
	Fan Only	55	52	53	49	42	38	27	59	54
030	Cooling Full	67	58	56	52	45	38	28	68	58
	Heating Full	67	58	66	52	46	39	30	68	58
	Fan Only	58	55	56	52	45	38	26	62	56
036	Cooling Full	65	62	62	63	58	52	43	70	66
	Heating Full	67	63	63	64	59	52	44	71	67
	Fan Only	65	62	62	63	58	52	43	70	66
042	Cooling Full	71	58	57	55	46	46	39	71	60
	Heating Full	73	58	57	55	47	47	39	73	61
	Fan Only	56	55	57	55	46	46	37	62	59
048	Cooling Full	72	63	58	57	51	43	38	73	62
	Heating Full	73	63	58	57	52	44	37	74	62
	Fan Only	60	61	57	57	51	43	34	66	60
060	Cooling Full	63	61	59	57	53	48	39	67	61
	Heating Full	64	61	58	58	53	49	40	67	62
	Fan Only	59	60	58	57	53	48	39	65	61
070	Cooling Full	66	64	65	59	57	53	44	71	66
	Heating Full	73	67	66	61	58	54	46	75	67
	Fan Only	62	63	65	59	57	53	44	69	66

NOTE: Tested according to AHRI 250 standard for ISO 13256 WLHP condition at rated water and air flow rate. Overall calculated using 125-8,000 Hz octave bands.

SOUND DATA — SOUND POWER LEVEL, DUCTED DISCHARGE

50PS UNIT	LOAD	OCTAVE BAND SOUND POWER LEVELS db, RE 10-12 WATTS								Overall (dBA)
		125	250	500	1000	2000	4000	8000	Overall	
007	Cooling Full	60	47	51	57	51	45	37	63	59
	Heating Full	61	50	51	53	47	46	39	63	56
	Fan Only	58	50	51	56	47	46	39	61	58
009	Cooling Full	62	52	53	55	50	51	47	64	59
	Heating Full	63	53	54	56	50	50	47	65	60
	Fan Only	63	53	54	55	49	51	47	65	59
012	Cooling Full	71	61	58	56	51	51	48	72	62
	Heating Full	71	62	59	58	50	51	48	72	63
	Fan Only	71	61	61	70	59	51	48	74	71
015	Cooling Full	66	50	56	53	47	46	37	67	58
	Heating Full	68	53	57	58	48	46	38	69	61
	Fan Only	61	49	57	57	48	46	37	64	60
018	Cooling Full	69	52	59	57	50	48	39	70	61
	Heating Full	70	53	60	57	49	48	39	71	62
	Fan Only	62	51	59	58	49	48	39	65	61
024	Cooling Full	70	55	63	52	51	57	43	71	62
	Heating Full	73	56	63	54	50	53	42	74	63
	Fan Only	66	55	63	52	50	53	43	68	62
030	Cooling Full	70	55	63	52	51	54	43	71	62
	Heating Full	73	56	63	54	50	53	42	74	63
	Fan Only	66	55	63	52	50	53	43	68	62
036	Cooling Full	78	64	71	60	59	62	55	79	71
	Heating Full	79	67	71	61	58	61	55	80	71
	Fan Only	79	66	71	60	58	61	55	80	71
042	Cooling Full	73	58	66	57	56	56	50	74	66
	Heating Full	75	59	66	56	56	56	49	76	66
	Fan Only	73	59	66	57	56	56	49	74	66
048	Cooling Full	75	62	66	59	58	61	53	76	68
	Heating Full	75	62	66	58	56	60	52	76	67
	Fan Only	76	63	66	59	57	60	53	77	68
060	Cooling Full	78	65	66	60	57	60	54	79	69
	Heating Full	76	64	67	60	54	59	52	77	68
	Fan Only	77	65	66	60	55	60	53	77	68
070	Cooling Full	81	68	72	64	62	64	54	82	73
	Heating Full	80	68	72	64	59	63	53	81	72
	Fan Only	82	69	72	64	61	64	54	83	73

NOTE: Tested according to AHRI 250 standard for ISO 13256 WLHP condition at rated water and air flow rate. Overall calculated using 125-8,000 Hz octave bands.

Electrical data



STANDARD MOTOR — PSC FOR 007-012, CONSTANT TORQUE FOR 015-070 MOTOR ELECTRICAL DATA

50PS UNIT SIZE	RATED VOLTAGE v-ph-Hz	COMPRESSOR			BLOWER MOTOR			MIN. CIRCUIT AMP	MAX FUSE
		Qty	RLA	LRA	Qty	FLA	HP		
007	280/230-1-60	1	2.5	17.7	1	0.96	0.10	4.1	15
	265-1-60	1	2.6	13.5	1	0.85	0.10	4.1	15
009	208/230-1-60	1	3.4	22.2	1	0.96	0.10	5.2	15
	265-1-60	1	2.9	18.8	1	0.85	0.10	4.5	15
012	115-1-60	1	9.6	58.4	1	2.20	0.10	14.2	20
	208/230-1-60	1	4.6	27.9	1	0.96	0.10	6.7	15
	265-1-60	1	3.8	22.2	1	0.85	0.10	5.6	15
015	208/230-1-60	1	5.6	29.0	1	2.80	0.33	9.8	15
	265-1-60	1	4.6	20.0	1	2.60	0.33	8.4	15
018	208/230-1-60	1	7.4	33.0	1	2.80	0.33	12.1	15
	265-1-60	1	6.0	28.0	1	2.60	0.33	10.1	15
024	208/230-1-60	1	13.5	58.3	1	2.80	0.33	19.7	30
	265-1-60	1	9.0	54.0	1	2.60	0.33	13.9	20
	208/230-3-60	1	7.1	55.4	1	2.80	0.33	11.7	15
	460-3-60	1	3.5	28.0	1	2.10	0.50	6.5	15
030	208/230-1-60	1	12.8	58.3	1	4.10	0.50	20.1	30
	265-1-60	1	9.6	54.0	1	3.60	0.50	15.6	25
	208/230-3-60	1	7.7	55.4	1	2.80	0.50	12.4	20
	460-3-60	1	3.6	28.0	1	2.10	0.50	6.6	15
036	208/230-1-60	1	16.0	77.0	1	6.00	0.75	26.0	40
	208/230-3-60	1	10.0	71.0	1	6.00	0.75	18.5	25
	460-3-60	1	4.7	38.0	1	4.60	0.75	10.5	15
042	208/230-1-60	1	16.7	79.0	1	6.00	0.75	26.9	40
	208/230-3-60	1	10.4	73.0	1	6.00	0.75	19.0	25
	460-3-60	1	5.8	38.0	1	4.60	0.75	11.9	15
048	208/230-1-60	1	19.9	109.0	1	6.00	0.75	30.9	50
	208/230-3-60	1	13.6	83.1	1	6.00	0.75	23.0	35
	460-3-60	1	6.1	41.0	1	4.60	0.75	12.2	15
060	208/230-1-60	1	25.0	134.0	1	7.60	1.00	38.9	60
	208/230-3-60	1	15.9	110.0	1	7.60	1.00	27.5	40
	460-3-60	1	7.1	52.0	1	4.00	1.00	12.9	20
070	208/230-1-60	1	26.3	134.0	1	7.60	1.00	40.5	60
	208/230-3-60	1	15.6	110.0	1	7.60	1.00	27.1	40
	460-3-60	1	7.8	52.0	1	4.00	1.00	13.8	20

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
RLA — Rated Load Amps

ECM MOTOR ELECTRICAL DATA

50PS UNIT SIZE	RATED VOLTAGE v-ph-Hz	COMPRESSOR			BLOWER MOTOR			MIN. CIRCUIT AMP	MAX FUSE
		Qty	RLA	LRA	Qty	FLA	HP		
015	208/230-1-60	1	5.6	29.0	1	2.8	0.33	9.8	15
	265-1-60	1	4.6	20.0	1	2.6	0.33	8.4	15
018	208/230-1-60	1	7.4	33.0	1	2.8	0.33	12.1	15
	265-1-60	1	6.0	28.0	1	2.6	0.33	10.1	15
024	208/230-1-60	1	13.5	58.3	1	2.8	0.33	19.7	30
	265-1-60	1	9.0	54.0	1	2.6	0.33	13.9	20
	208/230-3-60	1	7.1	55.4	1	2.8	0.33	11.7	15
	460-3-60*	1	3.5	28.0	1	4.1	0.50	8.5	15
030	208/230-1-60	1	12.8	58.3	1	4.3	0.50	20.3	30
	265-1-60	1	9.6	54.0	1	4.1	0.50	16.1	25
	208/230-3-60	1	7.7	55.4	1	4.3	0.50	13.9	20
	460-3-60*	1	3.6	28.0	1	4.1	0.50	8.6	15
036	208/230-1-60	1	16.0	77.0	1	6.8	0.75	26.8	40
	208/230-3-60	1	10.0	71.0	1	6.8	0.75	19.3	25
	460-3-60*	1	4.7	38.0	1	5.5	0.75	11.4	15
042	208/230-1-60	1	16.7	79.0	1	6.8	0.75	27.7	40
	208/230-3-60	1	10.4	73.0	1	6.8	0.75	19.8	30
	460-3-60*	1	5.8	38.0	1	5.5	0.75	12.8	15
048	208/230-1-60	1	19.9	109.0	1	6.8	0.75	31.7	50
	208/230-3-60	1	13.6	83.1	1	6.8	0.75	23.8	35
	460-3-60*	1	6.1	41.0	1	5.5	0.75	13.1	15
060	208/230-1-60	1	25.0	134.0	1	9.1	1.00	40.4	60
	208/230-3-60	1	15.9	110.0	1	9.1	1.00	29.0	40
	460-3-60*	1	7.1	52.0	1	6.9	1.00	15.8	20
070	208/230-1-60	1	26.3	134.0	1	9.1	1.00	42.0	60
	208/230-3-60	1	15.6	110.0	1	9.1	1.00	28.6	40
	460-3-60*	1	7.8	52.0	1	6.9	1.00	16.7	20

LEGEND

FLA — Full Load Amps
LRA — Locked Rotor Amps
RLA — Rated Load Amps

* 460-v unit contains 265-v fan motor and requires a neutral to power motor.

Electrical data (cont)



→ 50PSH,PSV UNITS WITH EH OPTION - CONSTANT TORQUE MOTOR ELECTRICAL DATA

UNIT SIZE	EH RATED kW	STAGE	HEATER WATTS		HEATER AMPS		MOTOR FLA (A)	CIRCUIT FUSES	MCA		MOP	
			240	208	240	208			240	208	240	208
018	4.8	1	4,800	3,600	20.0	17.3	2.8	—	28.5	25.1	30	30
024	4.8	1	4,800	3,600	20.0	17.3	2.8	—	28.5	25.1	30	30
	9.6	1	9,600	7,200	40.0	34.6	2.8	—	53.5	46.8	60	50
030	4.8	1	4,800	3,600	20.0	17.3	4.1	—	30.1	26.8	35	30
	9.6	1	9,600	7,200	40.0	34.6	4.1	—	55.1	48.4	60	50
036	4.8	1	4,800	3,600	20.0	17.3	6.0	—	32.5	29.1	35	30
	9.6	1	9,600	7,200	40.0	34.6	6.0	—	57.5	50.8	60	60
	14.4	2	14,400	10,800	60.0	51.9	6.0	F1/F2	82.5	72.4	90	80
								F3/F4				
042	4.8	1	4,800	3,600	20.0	17.3	6.0	—	32.5	29.1	35	30
	9.6	1	9,600	7,200	40.0	34.6	6.0	—	57.5	50.8	60	60
	14.4	2	14,400	10,800	60.0	51.9	6.0	F1/F2	82.5	72.4	90	80
								F3/F4				
048	4.8	1	4,800	3,600	20.0	17.3	6.0	—	32.5	29.1	35	30
	9.6	1	9,600	7,200	40.0	34.6	6.0	—	57.5	50.8	60	60
	14.4	2	14,400	10,800	60.0	51.9	6.0	F1/F2	82.5	72.4	90	80
								F3/F4				
	19.2	2	19,200	14,000	80.0	69.2	6.0	F1/F2 F3/F4	107.5	94.0	110	100
060	4.8	1	4,800	3,600	20.0	17.3	7.6	—	34.5	31.1	35	35
	9.6	1	9,600	7,200	40.0	34.6	7.6	—	59.5	52.8	60	60
	14.4	2	14,400	10,800	60.0	51.9	7.6	F1/F2	84.5	74.4	90	80
								F3/F4				
	19.2	2	19,200	14,000	80.0	69.2	7.6	F1/F2 F3/F4	109.5	96.0	110	100
070	4.8	1	4,800	3,600	20.0	17.3	7.6	—	34.5	31.1	35	35
	9.6	1	9,600	7,200	40.0	34.6	7.6	—	59.5	52.8	60	60
	14.4	2	14,400	10,800	60.0	51.9	7.6	F1/F2	84.5	74.4	90	80
								F3/F4				
	19.2	2	19,200	14,000	80.0	69.2	7.6	F1/F2 F3/F4	109.5	96.0	110	100

LEGEND

EH — Electric Heat
FLA — Full Load Amps
MCA — Minimum Circuit Amps
MOP — Maximum Overcurrent Protection

NOTE: Electric heat is not available for horizontal-straight through airflow configuration.

→ 50PSH,PSV UNITS WITH ELECTRIC HEAT OPTION - CONSTANT AIRFLOW ECM MOTOR ELECTRICAL DATA

UNIT SIZE	EH RATED kW	STAGE	HEATER WATTS		HEATER AMPS		MOTOR FLA (A)	CIRCUIT FUSES	MCA		MOP	
			240	208	240	208			240	208	240	208
018	4.8	1	4,800	3,600	20.0	17.3	2.8	—	28.5	25.1	30	30
024	4.8	1	4,800	3,600	20.0	17.3	2.8	—	28.5	25.1	30	30
	9.6	1	9,600	7,200	40.0	34.6	2.8	—	53.5	46.8	60	50
030	4.8	1	4,800	3,600	20.0	17.3	4.3	—	30.4	27.0	35	30
	9.6	1	9,600	7,200	40.0	34.6	4.3	—	55.4	48.6	60	50
036	4.8	1	4,800	3,600	20.0	17.3	6.8	—	33.5	30.1	35	35
	9.6	1	9,600	7,200	40.0	34.6	6.8	—	58.5	51.8	60	60
	14.4	2	14,000	10,800	60.0	51.9	6.8	F1/F2 F3/F4	83.5	73.4	90	80
042	4.8	1	4,800	3,600	20.0	17.3	6.8	—	33.5	30.1	35	35
	9.6	1	9,600	7,200	40.0	17.3	6.8	—	58.5	51.8	60	60
	14.4	2	14,400	10,800	60.0	51.9	6.8	F1/F2 F3/F4	83.5	73.4	90	80
048	4.8	1	4,800	3,600	20.0	17.3	6.8	—	33.5	30.1	35	35
	9.6	1	9,600	7,200	40.0	34.6	6.8	—	58.5	51.8	60	60
	14.4	2	14,400	10,800	60.0	51.9	6.8	F1/F2 F3/F4	83.5	73.4	90	80
	19.2	2	19,200	14,000	80.0	69.2	6.8	F1/F2 F3/F4	108.5	95.0	110	100
060	4.8	1	4,800	3,600	20.0	17.3	9.1	—	36.4	33.0	40	35
	9.6	1	9,600	7,200	40.0	34.6	9.1	—	61.4	54.6	70	60
	14.4	2	14,400	10,800	60.0	51.9	9.1	F1/F2 F3/F4	86.4	76.3	90	80
	19.2	2	19,200	14,000	80.0	69.2	9.0	F1/F2 F3/F4	111.4	97.9	120	100
070	4.8	1	4,800	3,600	20.0	17.3	9.1	—	36.4	33.0	35	35
	9.6	1	9,600	7,200	40.0	34.6	9.1	—	61.4	54.6	70	60
	14.4	2	14,400	10,800	60.0	51.9	9.1	F1/F2 F3/F4	86.4	76.3	90	80
	19.2	2	19,200	14,000	80.0	69.2	9.1	F1/F2 F3/F4	111.4	97.9	120	199

LEGEND

EH — Electric Heat
FLA — Full Load Amps
MCA — Minimum Circuit Amps
MOP — Maximum Overcurrent Protection

NOTE: Electric heat is not available for horizontal-straight through airflow configuration.

Application data



Aquazone™ water source heat pump products are available in a flexible, efficient array of models, which can be used in all types of water loop, ground water, and ground loop systems. Utilize Aquazone products to provide optimal energy efficient solutions and adapt to the most challenging design requirements.

AQUAZONE PRODUCT GUIDE

50 SERIES	TYPE SIZE (tons)	APPLICATION
50HQP,VQP	Large Capacity 6-10 (HQP) 6 1/2-25 (VQP)	Environmentally sound unit with Puron® refrigerant (R-410A) designed to handle large zoned areas for all geothermal and boiler/tower applications.
50PC	Compact 1 1/4-5	Compact WSHP with Puron refrigerant (R-410A) for boiler/tower, ground water, or ground loop systems.
50PS	Premium Efficiency 1/2-6	Premium, ultra efficient unit with Puron refrigerant (R-410A) for new boiler/tower, ground water, or ground loop systems.
50PEC	High Efficiency Console 3/4-1 1/2	Efficient console unit with Puron refrigerant (R-410A) and attractive design for finished interior, under-window installations.
50PT	Premium Efficiency 2-6	Premium, ultra efficient 2-stage unit with Puron refrigerant (R-410A) for new boiler/tower, ground water, or ground loop systems.
50PSW	Water-to-Water 3-28	Efficient unit with Puron refrigerant (R-410A) serves as an alternative to pre-heat or cool air. Unit can be used as a stand-alone or supplemental boiler/chiller in most hydronic heating applications. Also conditions process fluids, lubricants, and refrigerants.

Water loop system

Water loop (or boiler/tower) system applications typically include a number of units plumbed to a common piping system. For optimal performance, this system should be designed between 2.25 and 3 gpm per ton of cooling capacity. The system is comprised of highly efficient packaged reverse cycle heat pump units interconnected by a water loop. The water circuit serves as both a sink and source for heat absorption and rejection and is designed for entering water temperatures between 60 F and 90 F. Within this temperature range units can heat or cool as required from the same water source. Transferring heat from warm to cold spaces in the building, whenever they coexist, conserves energy rather than creating new heat.

Refer to the **Carrier Water Source Heat Pump System Design Guide** for assistance with the design of water loop systems. The guide includes a practical approach for the latest and most current design recommendations including:

- product application, including horizontal, vertical, console, rooftop and water-to-water applications
- ventilation methods and system design, including energy recovery
- acoustical considerations for different product types
- addressing indoor air quality (IAQ) issues such as condensate removal and humidity control
- air distribution design including diffuser selection/layout and ductwork design
- hydronic system design including pipe sizing/layout and boiler/tower sizing
- control configurations such as standalone, DDC, DCV, and VVT® controls

- Water Source Heat Pump Efficiency/Operational Cost Comparison chart
- system variations such as a system without a boiler, variable pumping, and variable air volume (VAV) for interior use

Ground water systems

To utilize Aquazone units in ground water applications, extended range should be specified. This will provide factory-installed insulation on the coaxial coil to prevent condensate from dripping when entering water temperatures are below 60 F. In addition, the copper coaxial coil installed on the Aquazone units may not be suitable for all water conditions. Refer to the Water Conditioning section for proper coaxial coil material selection.

Surface water system — This system is typically located near a lake or pond. In this application, the loop can be submerged in a series of coils beneath the water surface. The number of coils required depends on system load and design. This application requires minimum piping and excavation.

Open loop system — This system is used where ground water is plentiful. In this application, ground water is pumped through supply piping from the well to the building. The water is then pumped back into the ground through a discharge well as it leaves the building. An additional heat exchanger is usually installed between the building water piping system and the ground water piping system. This design limits the amount of piping and excavation required.

Aquazone units are provided with a standard thermostatic expansion valve (TXV) and are rated to extremely low temperatures to self-adjust the refrigeration circuit, therefore water regulating valves are not required on open loop systems. To conserve water on this type of system, a slow opening/closing solenoid valve is recommended.

Ground loop systems

There are many commonly specified designs for ground loop applications. Typical designs include vertical and horizontal loops. In some applications, water is piped from the ground or lake directly to the water source heat pump. Piping is limited to the amount of pipe required to get the water from the source to the unit.

NOTE: When utilizing Aquazone water source heat pumps in ground loop systems, refer to design considerations in the ground water system section.

Horizontal ground loop — This system is used when adequate space is available and trenching can be easily accomplished. A series of parallel pipes are laid out in trenches 3 to 6 ft below the ground surface, and then back-filled. Often, multiple pipes are used to maximize the heat transfer capability of each trench. The amount of pipe and the size of the ground loop field are based on ground conditions, heating, and cooling requirements of the application and system design.

Vertical ground loop — This system is used in vertical borehole applications. This design is well suited for retrofit applications when space is limited or where landscaping is already complete and minimum disruption of the site is desired. The vertical ground loop system contains a single

loop of pipe inserted into a hole. The hole is back-filled and grouted after the pipe is inserted. The completed loop is concealed below ground. The number of loops required depends on ground conditions, heating and cooling requirements, and the depth of each hole.

Hybrid systems — In some applications, it may be beneficial to incorporate a cooling tower into the ground loop system to reduce the overall cost. A hybrid system discards excess heat into the air and increases the cooling performance of the ground loop.

Condensate drainage

Venting — Condensate lines should be properly vented to prevent fan pressure from causing water to hang up in the piping. Condensate lines should be pitched to assure full drainage of condensate under all load conditions. Chemical treatment should be provided to remove algae in the condensate pans and drains in geographical areas that are conducive to algae growth.

Trapping — Condensate trapping is essential on every water source heat pump unit. A trap is provided to prevent the backflow of moisture from the condensate pan and into the fan intake or downstream into the mechanical system. The water seal or the length of the trap depends on the positive or negative pressure on the drain pan. As a rule of thumb, the water seal should be sized for 1 in. for every 1 in. of negative pressure on the unit. The water seal is the distance from the bottom of the unit condensate piping connection to the bottom of the condensate drain line run-out piping. Therefore, the trap size should be double the water seal dimension.

Horizontal units — Horizontal units should be sloped toward the drain at a $\frac{1}{4}$ in. per foot pitch. If it is not possible to meet the pitch requirement, a condensate pump should be designed and installed at the unit to pump condensate to a building drain. Horizontal units are not internally trapped; therefore an external trap is necessary. Each unit must be installed with its own individual trap and means to flush or blow out the condensate drain. The design of a common trap or vent for multiple units is not acceptable.

The condensate piping system should not be designed with a pipe size smaller than the drain connection pipe size.

Vertical units — Vertical units utilize a condensate hose inside the cabinet that acts as a trapping loop, therefore an external trap is not necessary. Each unit must be installed with its own vent and means to flush or blow out the condensate drain lines. Do not install a common trap or vent on vertical units.

Water conditioning

In some applications, maintaining proper water quality may require the use of higher corrosion protection for the water-to-refrigerant heat exchanger. Water quality varies from location to location and is unique for each job. Water characteristics such as pH value, alkalinity, hardness, and specific conductance are of importance when considering any WSHP application. Water typically includes impurities and hardness that must be removed. The required treatment will depend on the water quality as well as type of system. Water problems fall into three main categories:

1. Scale formation caused by hard water reduces the heat transfer rate and increases the water pressure drop through the heat exchanger. As water is heated, minerals and salts are precipitated from a solution and deposited on the inside surface of the pipe or tube.
2. Corrosion is caused by absorption of gases from the air coupled with water on exposed metal. Corrosion is also common in salt-water areas.
3. Organic growths such as algae can reduce the heat transfer rate by forming an insulating coating on the inside tube surface. Algae can also promote corrosion by pitting.

NOTE: In most commercial water loop applications, Aquazone™ WSHP units use a copper water-to-refrigerant heat exchanger. Units can also be equipped with a cupronickel heat exchanger for applications where water is outside the standard contaminant limits for a copper heat exchanger.

Application data (cont)



WATER QUALITY GUIDELINES

CONDITION	HX MATERIAL *	CLOSED RECIRCULATING†	OPEN LOOP AND RECIRCULATING WELL**		
Scaling Potential — Primary Measurement					
Above the given limits, scaling is likely to occur. Scaling indexes should be calculated using the limits below.					
pH/Calcium Hardness Method	All	N/A	pH < 7.5 and Ca Hardness, <100 ppm		
Index Limits for Probable Scaling Situations (Operation outside these limits is not recommended.)					
Scaling indexes should be calculated at 150 F for direct use and HWG applications, and at 90 F for indirect HX use. A monitoring plan should be implemented.					
Ryznar Stability Index	All	N/A	6.0 - 7.5 If >7.5 minimize steel pipe use.		
Langelier Saturation Index	All	N/A	-0.5 to +0.5 If <-0.5 minimize steel pipe use. Based upon 150 F HWG and direct well, 85 F indirect well HX.		
Iron Fouling					
Iron Fe ²⁺ (Ferrous) (Bacterial Iron Potential)	All	N/A	<0.2 ppm (Ferrous) If Fe ²⁺ (ferrous) >0.2 ppm with pH 6 - 8, O ₂ <5 ppm check for iron bacteria.		
Iron Fouling	All	N/A	<0.5 ppm of Oxygen Above this level deposition will occur.		
Corrosion Prevention††					
pH	All	6 - 8.5 Monitor/treat as needed.	6 - 8.5 Minimize steel pipe below 7 and no open tanks with pH <8.		
Hydrogen Sulfide (H ₂ S)	All	N/A	<0.5 ppm At H ₂ S>0.2 ppm, avoid use of copper and cupronickel piping or HXs. Rotten egg smell appears at 0.5 ppm level. Copper alloy (bronze or brass) cast components are okay to <0.5 ppm.		
Ammonia Ion as Hydroxide, Chloride, Nitrate and Sulfate Compounds	All	N/A	<0.5 ppm		
Maximum Chloride Levels	Copper Cupronickel 304 SS 316 SS Titanium	N/A N/A N/A N/A N/A	Maximum allowable at maximum water temperature.		
			50 F (10 C)	75 F (24 C)	100 F (38 C)
			<20 ppm	NR	NR
			<150 ppm	NR	NR
			<400 ppm	<250 ppm	<150 ppm
<1000 ppm	<550 ppm	<375 ppm			
>1000 ppm	>550 ppm	>375 ppm			
Erosion and Clogging					
Particulate Size and Erosion	All	<10 ppm of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size.	<10 ppm (<1 ppm "sandfree" for reinjection) of particles and a maximum velocity of 6 fps. Filtered for maximum 800 micron size. Any particulate that is not removed can potentially clog components.		
Brackish	All	N/A	Use cupronickel heat exchanger when concentrations of calcium or sodium chloride are greater than 125 ppm are present. (Seawater is approximately 25,000 ppm.)		

LEGEND

- HWG** — Hot Water Generator
HX — Heat Exchanger
N/A — Design Limits Not Applicable Considering Recirculating Potable Water
NR — Application Not Recommended
SS — Stainless Steel

*Heat exchanger materials considered are copper, cupronickel, 304 SS (stainless steel), 316 SS, titanium.

†Closed recirculating system is identified by a closed pressurized piping system.

**Recirculating open wells should observe the open recirculating design considerations.

††If the concentration of these corrosives exceeds the maximum allowable level, then the potential for serious corrosion problems exists.

Sulfides in the water quickly oxidize when exposed to air, requiring that no agitation occur as the sample is taken. Unless tested immediately at the site, the sample will require stabilization with a few drops of one Molar zinc acetate solution, allowing accurate sulfide determination up to 24 hours after sampling. A low pH and high alkalinity can cause system problems, even when both values are within ranges shown. The term pH refers to the acidity, basicity, or neutrality of the water supply. Below 7.0, the water is considered to be acidic. Above 7.0, water is considered to be basic. Neutral water registers a pH of 7.0.

To convert ppm to grains per gallon, divide by 17. Hardness in mg/l is equivalent to ppm.

Acoustical design

Sound power levels represent the sound as it is produced by the source, the WSHP unit, with no regard to attenuation between the source and the space. Acoustical design goals are necessary to provide criteria for occupied spaces where people can be comfortable and communicate effectively over the background noise of the air-conditioning system and other background noise sources.

Acoustical design goals are desirable sound pressure levels within a given conditioned space and are represented by noise criteria (NC) curves. The NC curve levels represent a peak over a full spectrum of frequencies. A high value in a low frequency band has the same effect on NC level as a lower value in a high frequency band. It is important that sound levels be balanced over the entire spectrum relative to the NC curve. The lower the NC criteria curve, the more stringent the room acoustical design must be to meet the design goals.

It is important to know how to convert NC levels from the unit ratings in terms of sound power (Lw). This conversion depends on the specifics of the acoustical environment of the installation.

The resulting calculations are compared to the NC curve selected for the area to assess the acoustical design.

Some of the factors that affect conversion of sound power to sound pressure and consequent NC level include:

- type of acoustical ceiling
- use of metal or flex duct
- absorption in the occupied space
- location in the occupied space
- open or closed layout plan
- use of open or ducted returns
- orientation of unit to occupant
- use of lined or unlined duct

WSHP sound control

The analysis of the projected sound level in the conditioned space caused by a WSHP unit located in a ceiling plenum is quite involved. The key is to have good sound power ratings (Lw) in dB on the equipment to determine the sound attenuation effect of the ductwork, ceiling and room. In combination with utilizing standard Aquazone™ equipment attenuating features or the advanced mute package features, suggestions for horizontal and vertical unit sound design are provided to design around the WSHP units.

Horizontal units

Use the following guidelines for layout of Aquazone horizontal units to minimize noise:

1. Obtain sound power ratings in accordance with latest standards from manufacturers to select quietest equipment.
2. Do not locate units over a space with a required NC of 40 or less. Instead, locate units above less sensitive noise areas such as above or in equipment rooms, utility closets, restrooms, storage rooms, or above corridors.
3. Provide at least 10 feet between WSHP units to avoid the additive effect of two noise sources.

4. Provide an acoustical pad underneath the WSHP unit in applications where the unit must be mounted above noise sensitive areas such as private offices or conference rooms. The pad attenuates radiated noise. Be sure the pad has an area at least twice that of the WSHP footprint.
5. Maximize the installed height above the suspended ceiling.
6. Be sure the WSHP unit is located at least 6 feet away from any ceiling return grille to prevent line-of-sight casing noise from reaching the space below.
7. Suspend the WSHP unit from the ceiling with hangers that utilize spring or neoprene type isolators to reduce vibration transmission.
8. Utilize flexible electrical connections to the WSHP unit. **DO NOT USE NOT RIGID CONNECTIONS.**
9. Utilize flexible loop water and condensate piping connections to the WSHP unit.
10. Use a canvas duct connector to connect the WSHP discharge to the downstream duct system. This reduces vibration-induced noise.
11. Provide acoustic interior lining for the first 20 feet of discharge duct, or until the first elbow is reached. The elbow prevents line-of-site sound transmission in the discharge duct.
12. Provide turning vanes in ductwork elbows and tees to reduce air turbulence.
13. Size the sheet metal supply duct with velocities no greater than 1000 fpm.
14. Ensure ductwork is rigid.
15. Use round duct whenever possible to further reduce noise.
16. Allow at least 3 equivalent duct diameters of straight duct upstream and downstream of the unit before allowing any fittings, transitions, etc.
17. Seal all penetrations around duct entering the space.
18. Provide a 4-ft run-out duct made of flexible material to connect a diffuser to the supply trunk duct. The flex duct provides an "attenuating end-effect" and reduces duct-transmitted sound before it reaches the space. Typically a 6 dB sound reduction can be accomplished with the use of flex duct.
19. Locate the run-out duct balancing damper as far away from the outlet diffuser as possible. Locating the balancing damper at the trunk duct exit is the best location.
20. If return air is drawn through a ceiling plenum, provide an acoustically lined return duct elbow or "L" shaped boot at the WSHP to eliminate line-of-sight noise into the ceiling cavity and possibly through ceiling return air grilles. Face the elbow or boot away from the nearest adjacent WSHP unit to prevent additive noise.
21. Do not hang suspended ceiling from the ductwork.

Application data (cont)



Vertical units

All guidelines established for horizontal units also apply for vertical units. In addition, since vertical units tend to be installed in small equipment rooms or closets, the following guidelines apply:

1. Mount the unit on a pad made of high-density sound absorbing material such as rubber or cork. Extend the pad beyond the WSHP unit footprint by at least 6 inches in each direction.
2. Since the unit returns airflow through a grille mounted in a closet door, provide a sound barrier or some other modification of the closet to prevent line-of-sight noise into the space.
3. Follow good duct design practice in sizing and locating the connection of the WSHP discharge to the supply duct system. Use an elbow with turning vanes and bent in the direction of the fan rotation to minimize turbulence. Make any duct transitions as smooth and as gradual as possible to again minimize turbulence and loss of fan static pressure.

Solenoid valves

In applications using variable flow pumping, solenoid valves can be field-installed and operated from the control board in the Aquazone™ WSHP unit.

Freeze protection

Applications where systems are exposed to outdoor temperatures below freezing (32 F) must be protected from freezing. The most common method of protecting water systems from freezing is adding glycol concentrations into the water. Design care should be used when selecting both the type and concentrations of glycol utilized due to the following:

- Equipment and performance may suffer with high concentrations of glycol and other antifreeze solutions.
- Loss of piping pressure may increase greatly, resulting in higher pumping costs.
- Higher viscosity of the mixture may cause excess corrosion and wear on the entire system.
- Acidity of the water may be greatly increased, promoting corrosion.
- Glycol promotes galvanic corrosion in systems of dissimilar metals. The result is corrosion of one metal by the other, causing leaks.

Guide specifications



Single-Stage Water Source Heat Pumps with Puron® Refrigerant (R-410A)

HVAC Guide Specifications (Water Loop)

Size Range: **6,800 to 68,000 Btuh**

Cooling Capacity

8,800 to 86,000 Btuh

Heating Capacity

Carrier Model Number: **50PSH, 50PSV**

Part 1 — General

1.01 SYSTEM DESCRIPTION

- A. Single package horizontally and vertically mounted water source heat pumps with Puron® refrigerant (R-410A) and electronic controls.
- B. Equipment shall be completely assembled, piped and internally wired. Capacities and characteristics as listed in the schedule and the guide specifications that follow.

1.02 QUALITY ASSURANCE

- A. All equipment listed in this section must be rated and certified in accordance with ARI/ISO and ETL listed to UL standard 1995. The units shall have ARI/ISO and ETL labels.
- B. All units shall be fully quality tested by factory run testing under normal operating modes and safety switch operation shall be verified.
- C. Serial numbers will be recorded by factory and furnished to contractor on report card for ease of unit warranty status. Units shall be prewired and pre-charged in factory.

Part 2 — Product

2.01 EQUIPMENT

A. General:

Units shall be supplied completely factory built for an entering water temperature range from 50 to 100 F as standard. Units may consist of rotary or scroll compressor, PSC (permanent split capacitor), constant torque motor or ECM (electronically controlled motor) fan motor and blower and refrigerant circuit as indicated on the equipment schedule. Equivalent units from other manufacturers can be proposed provided approval to bid is given 10 days prior to bid closing.

B. Basic Construction:

1. Units shall have the air flow arrangement as shown on the plans. If units with these arrangements are not used, the contractor supplying the water source heat pumps is responsible for any extra costs incurred by other trades and must submit detailed mechanical drawings showing ductwork requirements and changes or relocation of any other mechanical or electrical system. If other arrangements make servicing difficult the contractor must provide access panels and clear routes to ease service. The architect must approve all changes 10 days prior to bid.

2. All units shall have stainless steel drain pans to comply with this project's IAQ (indoor air quality) requirements. No exceptions shall be allowed.
3. All water source heat pumps shall be fabricated from sheet metal finished with G90 galvanized steel. All interior surfaces shall be lined with 1/2-in. thick, multi-density acoustic insulation. All insulation must meet NFPA 90A and be certified to meet the GREENGUARD Indoor Air Quality Standard for Low Emitting Products. One blower access panel and two compressor compartment access panels shall be removable with supply and return air ductwork in place.
4. Unit shall have a floating base pan consisting of a 1/2-in. (12 mm) thick high density rubber pad between the compressor base plate and the unit base pan to prevent transmission of vibration to the structure.
5. All units shall have a factory-installed four-sided filter rack capable of accepting either one or 2-in. filters. Units shall have a 1-in. thick throw-away type glass fiber filter as standard. The filter rack shall incorporate a 1-in. duct flange. The contractor shall purchase one spare set of filters and replace factory-shipped filters upon completion of start-up.
6. Cabinets shall have separate holes and knock-outs for entrance of line voltage and low voltage control wiring. Supply and return water connections shall be brass FPT fittings and shall be securely mounted flush to the cabinet allowing for connection to a flexible hose without the use of a back-up wrench. Water connections which protrude through the cabinet shall not be allowed.
7. Hanging brackets shall be provided as standard for horizontal units.
8. All units shall have condensate overflow switch, Air-Coil and Water-Coil Freeze sensor as standard.

C. Compressor:

1. Compressor section interior surfaces shall be lined with 1/2 in. thick, dual density, 1 3/4 lb per cu ft acoustic type fiberglass insulation. Air-handling section interior surfaces shall be lined with 1/2 in. thick, single density, 1 3/4 lb per cu ft foil-backed fiber insulation for ease of cleaning.
2. Insulation placement shall be designed in a manner that will eliminate any exposed edges to prevent the introduction of glass fibers into the airstream. Units without foil-backed insulation in the air-handling section will not be accepted.
3. The compressor shall have a dual level vibration isolation system.
4. The compressor will be mounted on computer-selected vibration isolation springs to a large heavy

gage compressor mounting tray plate, which is then isolated from the cabinet base with rubber grommets for maximized vibration attenuation.

5. Compressor shall be located in an insulated compartment away from airstream to minimize sound transmission.
6. Compressor shall have thermal overload protection.
7. The heat pumps shall be fabricated from heavy gage G90 galvanized steel with powder coat paint finish. Both sides of the steel shall be painted for added protection.
8. All units must have an insulated panel separating the fan compartment from the compressor compartment.
9. Units with the compressor in the airstream are not acceptable.

D. Fan and Motor Assembly:

1. The fan shall be direct-drive centrifugal forward curved type with a dynamically balanced wheel. The housing and wheel shall be designed for quiet low velocity operation. The blower housing shall feature a removable inlet ring to facilitate removal and servicing of the fan motor. The fan motor shall be 3-speed, permanently lubricated, PSC type with thermal overload protection on unit sizes $1\frac{1}{2}$ through 1 tons.
- 2. Unit sizes $1\frac{1}{4}$ through 6 tons shall have a constant torque motor for premium fan efficiency. These motors shall feature 5 pre-programmed torque settings that can be changed in the field to match design requirements. 460V-3Ph-60Hz units with these motors must be able to operate without the need for a neutral wire for the motor.
3. Unit sizes $1\frac{1}{4}$ through 6 tons shall have an optional direct-drive centrifugal fan. The fan motor shall be a factory preprogrammed high efficiency constant torque ECM type. The fan motor shall be isolated from the fan housing by torsionally flexible isolation.
4. Blower shall have inlet rings to allow removal of wheel and motor from one side without removing housing.
5. The fan motor shall be isolated from the housing by rubber grommets.

E. Refrigerant Circuit:

1. All units shall contain a Puron® refrigerant (R-410A) sealed circuit including a high-efficiency Copeland UltraTech™ single-stage compressor designed for heat pump operation, a thermostatic expansion valve for refrigerant metering, an enhanced corrugated aluminum lanced fin and rifled copper tube refrigerant to air heat exchanger, reversing valve, coaxial (tube-in-tube) refrigerant to water heat exchanger, and safety controls, including a high-pressure switch, low-pressure switch (loss

of charge), water coil low temperature sensor, and air coil low temperature sensor.

2. Access fittings shall be factory-installed on high and low pressure refrigerant lines to facilitate field service.
3. Refrigerant metering shall be accomplished by thermostatic expansion valve only.

F. Drain Pan:

1. The drain pan shall be constructed of 304 stainless steel to inhibit corrosion.
2. Drain pan shall be fully insulated.
3. Drain outlet shall be located at pan as to allow complete and unobstructed drainage of condensate. Drain outlet for horizontal units shall be connected from pan directly to FPT fitting. No hidden internal tubing extensions from pan outlet extending to unit casing (that can create drainage problems) will be accepted.
4. The unit as standard will be supplied with solid-state electronic condensate overflow protection. A mechanical float switch will be used with Standard C board.
5. Vertical units shall be furnished with a PVC slip condensate drain connection and an internal factory-installed condensate trap. If units without an internal trap are used, the contractor is responsible for any extra costs to field install these provisions, and/or the extra costs for the subcontractor to install these provisions.

G. Thermostatic Expansion Valve:

1. Expansion valves shall be dual port balanced types with external equalizer for optimum refrigerant metering.
2. Units shall be designed and tested for operating ranges of entering water temperatures from 25 to 110 F.
3. Reversing valve shall be four-way solenoid activated refrigerant valve, which shall default to heating mode should the solenoid fail to function. If the reversing valve solenoid defaults to cooling mode, an additional low temperature thermostat must be provided to prevent over-cooling an already cold room.

H. Controls and Safeties:

1. Electrical:

A control box shall be located within the unit and shall contain a transformer, controls for the compressor, reversing valve and fan motor operation and shall have a terminal block for low voltage field wiring connections. The transformer shall be rated for a minimum 75 va. All units shall be nameplated for use with time delay fuses or HACR (Heating, Air-Conditioning, and Refrigeration) circuit breakers. Unit controls shall be 24 volts.

2. Solid-State Safety Circuit:

All units shall have a solid-state UPM (unit protection module) safety control circuit with the following features:

- a. Anti-short cycle time delay on compressor operation.
- b. Random start on power up mode.
- c. Brown out/Surge/Power Interruption protection.
- d. Low Pressure Switch 120 second bypass timer.
- e. Shutdown on the following fault indications:
 - 1) High or low refrigerant pressure safety switches inputs.
 - 2) Freeze sensors shall monitor refrigerant temperature to the water coil in the heating mode and refrigerant coil in the cooling mode.
 - 3) Condensate sensor input.
- f. Alarm output which closes for selectable dry contact closure or 24 vac remote fault indication.
- g. Alarm output selectable for constant output for general alarm notification, or pulse output for annunciation of the specific fault alarm.
- h. Selectable reset of unit at thermostat or disconnect.
- i. Automatic intelligent reset. Unit shall automatically reset after a safety shut down and restart after the anti-short cycle timer and random start timer expire. Should a fault re-occur within 60 minutes after reset, then a permanent lockout will occur. Reset attempts shall be selectable for either 2 or 4 tries. A condensate overflow will place the unit in an immediate hard lockout.
- j. Ability to defeat time delays for servicing.
- k. A light emitting diode (LED) to indicate safety alarms. The LED shall annunciate the following alarms:
 - 1) High refrigerant pressure,
 - 2) Low refrigerant pressure,
 - 3) Low refrigerant temperature to the water coil in the heating operation,
 - 4) High level of condensate in the drain pan,
 - 5) Brown out/surge/power interruption.
- l. The LED will display each fault condition as soon as the fault occurs. If a permanent lockout occurs, then the fault LED will display the type of fault until the unit is reset.
- m. UL listed, CUL listed, and RFI, ESD, and transient protected.
- n. Freeze Protection: A freeze stat shall sense the entering refrigerant temperature to the coaxial coil (in the heating mode) and shall activate the compressor lockout circuit when

the refrigerant temperature drops below either 15 F or 30 F. The factory default is 30 F and the temperature setting may be set at 15 F by cutting the resistor (R-42) located above dip switch. The freeze stat may not provide protection in the case of loss of flow in the heating mode. A flow switch or pressure differential switch is recommended to prevent unit operation in case of loss of flow. A second freeze sensor shall be mounted at the refrigerant inlet to the air coil. Should the refrigerant temperature drop below 30 F the unit will go into a soft lockout.

3. Deluxe D Controls:

Optional electronic Deluxe D control shall have all the features of the Complete C control with the following additional features:

- a. 75 va transformer.
- b. A removable thermostat connector.
- c. Random start on return from night setback.
- d. Intelligent reversing valve operation for extended life and quiet operation.
- e. Night setback control from low temperature thermostat, with 2-hour override initiated by a momentary signal from the thermostat.
- f. Dry contact night setback output for digital night setback thermostats.
- g. Ability to work with heat/cool (Y, W) thermostats.
- h. Ability to work with heat pump thermostats using O or B reversing valve control.
- i. Single grounded wire to initiate night setback, or emergency shutdown.
- j. Boilerless system control can switch automatically to electric heat at low loop water temperature.
- k. Dehumidistat input providing fan control for dehumidification operation via the Ideal-Humidity™ system.
- l. Multiple units connected to one sensor providing communication for up to 3 water source heat pumps.
- m. Selection of boilerless changeover temperature set point.
- n. Compressor relay staging for dual stage units or in master/slave applications.

Units not having automatic low sensible heat ratio cooling will not be accepted; as an alternate, a hot gas reheat coil may be provided with control system for automatic activation.

I. Piping:

1. Supply and return water connections shall be copper FPT fittings and shall be securely mounted flush to the cabinet corner post allowing for connection to a flexible hose without the use of a back-up wrench.

2. All water connections and electrical knockouts must be in the compressor compartment corner post so as to not interfere with the serviceability of unit. Contractor shall be responsible for any extra costs involved in the installation of units that do not have this feature.
- J. Solid-State Permanent Split Capacitor (PSC) Fan Control Board:
1. Airflow selection shall be accomplished via 3 jumper switches on the PSC control board. Actual airflow shall be indicated by the cfm LED with each 100 cfm being represented by one flash of the LED.
 2. Airflow shall be automatically maintained ($\pm 5\%$) by the PSC motor regardless of external static pressure up to its maximum output capacity.
 3. A jumper shall allow selection of a special dehumidification mode, which reduces airflow in cooling by 25% to increase the latent capacity of the unit. A terminal shall be provided on the control board to allow an external humidistat to activate dehumidification mode.
- K. Remote Service Sentinel (Complete C or Deluxe D):
1. Solid-state control system shall communicate with thermostat to display (at the thermostat) the unit status, fault status, and specific fault condition, as well as retrieve previously stored fault that caused unit shutdown.
 2. The remote service sentinel allows building maintenance personnel or service personnel to diagnose unit from the wall thermostat.
 3. The control board shall provide a signal to the thermostat fault light, indicating a lockout.
 4. Upon cycling the G (fan) input 3 times within a 60-second time period, the fault light shall display the specific code as indicated by a sequence of flashes. A detailed flashing code shall be provided at the thermostat LED to display unit status and specific fault status such as over/under voltage fault, high pressure fault, low pressure fault, low water temperature fault, condensate overflow fault, etc.
 5. Units that do not provide this remote service sentinel shall not be acceptable.
- L. Special Features:
1. Extra quiet construction: Optional compressor blanket shall be provided on units having a capacity above 24,000 Btuh.
 2. Hot Gas Reheat: Units as noted on the schedule shall be equipped with optional Hot Gas Reheat (HGRH). On/Off HGRH shall be controlled by a humidistat connected to the unit H terminal and shall start the unit in the reheat mode should the humidity be above set point once the thermostat control is satisfied. Cooling or heating requirements shall take precedence over HGRH.
 3. Water Differential Switch. A water differential switch shall be factory piped between the fluid inlet and outlet piping to prevent unit operation if there is no fluid flow.
 4. Unit mounted disconnect. A non fused factory mounted disconnect shall be installed on the unit.
 5. Two Way Motorized Water valve: A two way motorized water valve shall be mounted in the interior of the unit. The valve shall cycle open whenever there is a call for compressor operation. The valve shall be equipped with an end switch.
 6. Internal Load Match Pump: An internal load match pump shall be installed in the unit. (208/230-v units only.)
 7. Conversion Kit for horizontal discharge configuration shall be available should the discharge arrangement need to be field changed.
 8. Electric Heat: Factory installed UL listed electric heater packages shall be available for the units. Available only on vertical units with top discharge and horizontal units with end blow configuration.
 9. The following relays shall be factory installed in the unit
 - a. EMS Relay for remote enabling of the unit.
 - b. Auxiliary pump relay to enable a pump operation when calling for compressor operation.
 - c. Compressor monitoring relay – provides a contact closure whenever the compressor contactor is energized
 10. Soft Start shall be installed to limit inrush current on startup. (208/230-v units only.)
 11. Phase Loss and reversal protection shall be provided on the unit to protect the compressor from operating in reverse rotation.
 12. A Comfort alert module shall be installed in the units to assist in service diagnostics.
 13. Thermostat Controls:
 - a. Programmable multi-stage thermostat offers 7-day clock, holiday scheduling, large backlit display and remote sensor capability.
 - b. Programmable 7-day light-activated thermostat offers occupied comfort settings with lights on, unoccupied energy savings with lights off.
 - c. Programmable 7-day flush-mount thermostat offers locking coverplate with tamper proof screws, flush to wall mount, dual point with adjustable deadband, O or B terminal, and optional remote sensor.
 14. Evaporator coil protection shall be factory installed to provide protection from corrosion in coastal areas, marine applications or other areas in which corrosion may be an issue.

